

IMPERIAL MYCOLOGICAL INSTITUTE

---

REVIEW  
OF  
APPLIED MYCOLOGY

---

VOL. XIV

DECEMBER

1935

---

RYKER (T. C.). **Fusarium yellows of Celery.**—*Phytopathology*, xxv, 6, pp. 578-600, 4 figs., 3 graphs, 1935.

A full, tabulated account is given of the writer's studies at Wisconsin University on the pathogenicity, environmental relations, and cultural and pathogenic variability of the agent of celery yellows (*Fusarium* sp.) [R.A.M., xiv, p. 498].

The symptoms of the disease were found to be well-marked and to agree with the published descriptions [ibid., i, p. 101; iv, p. 138]. In the greenhouse tests on Golden Self-Blanching and Michigan Golden Self-Blanching two types of chlorosis were differentiated according to the strain of the fungus used. One (produced only by a strain from Green Bay, Wisconsin) appeared as a yellow flecking due to a clearing of the tissue near the veins and to the progressive chlorosis of the small islands of foliar tissue subtended by the veinlets. Three other strains from Waukesha, Wisconsin, and one from Michigan at first caused clearing only near the larger veins, gradually followed by generalized chlorosis. The pathogenicity of the Wisconsin and Michigan strains did not differ essentially, but there were variations in the degree of virulence and in certain cultural characters. On potato-dextrose agar the minimum, optimum, and maximum temperatures for all strains were about 8°, 28°, and 36° C., good growth being made, however, throughout the range from 20° to 32°. The development of the host is favoured by soil temperatures between 18° and 28°, above which there is marked stunting. In the susceptible Golden Self-Blanching variety yellows developed at a soil temperature range of 18° to 32°, the incubation period decreasing proportionately with the increase of temperature up to 28°. The reaction of certain varieties was modified by soil temperature, Michigan Golden Self-Blanching being highly resistant only at 18°, Winter Queen and Curly Leaf Easy-Bleaching up to 26°, while Michigan Golden withstood infection by all the strains throughout the range investigated up to 31°. All inoculated varieties, whether they became diseased or not, revealed the presence of the *Fusarium* in the cortical region of the secondary roots, but only those manifesting yellows symptoms contained it in the vessels of the primary root. The virulence of the disease was less in relatively dry soils (50 per cent. of the water-holding capacity) than in damp ones (70 per cent.).

OKABE (N.). *Bacterial diseases of plants occurring in Taiwan (Formosa).*  
V.—*J. Soc. trop. Agric. Taiwan*, vii, pp. 57-66, 1935.

Brussels white-leaved chicory (*Cichorium intybus*) in the Taihoku district of Formosa is liable to a soft rot of bacterial origin almost identical in appearance with that due to *Bacillus aroideae* or *B. carotovorus* [R.A.M., xiii, p. 492]. The lesions at first assume the form of water-soaked, warm- to cinnamon-buff streaks on the older petioles at or near soil level. Under humid conditions the streaks rapidly extend upwards to the midribs or leaf veins and turn warm sepia or snuff-brown. Complete rotting of the tissues ensues, followed by collapse of the affected leaves. On the leaf blades the water-soaked, chrysolite-green spots frequently show a sayal-brown centre and one to three yellowish-green concentric rings.

The causal organism, to which the name *Bacterium formosanum* n.sp. is given, is a motile rod with rounded ends and one to eight polar or rarely bipolar flagella, occurring singly, in pairs, or occasionally in short chains, and forming neither spores nor capsules; colonies on beef extract agar round to amoeboid, convex to raised, glistening, smooth, transparent, opalescent, bluish-, later greyish-white, producing a bluish-green fluorescence in bouillon and Uschinski's and Fermi's solutions; gelatine not liquefied; indol and ammonia formed, but no hydrogen sulphide; milk cleared without curd formation; nitrates not reduced; acid without gas from dextrose, galactose, mannose, levulose, mannose, and glycerine; good growth in Cohn's solution with crystal formation; minimum, optimum, and maximum temperatures and death point, 0° to 5°, 28° to 31°, 35° to 36°, and 61° C., respectively; viability in culture media extending up to 200 days.

Positive results were given by inoculation experiments on chicory, lettuce (*Lactuca sativa*, *L. debilis* Benth. et Hook, and *L. dracoglossa* Mak.), cucumber, potato, tomato, tobacco, carrot (roots), cabbage (including *Brassica pekinensis* and *B. chinensis*), turnip, beet, onion (*Allium cepa* and *A. fistulosum*), Oriental radish (*Raphanus acanthiformis* M. Morel), *Chrysanthemum coronarium*, *Calendula officinalis*, and other plants.

BUTLER (K. D.). *The Cotton root rot fungus, Phymatotrichum omnivorum, parasitic on the Watermelon, Citrullus vulgaris.*—*Phytopathology*, xxv, 6, pp. 559-577, 3 pl., 1 fig., 1935.

Watermelons in commercial plantings in Arizona are stated to have repeatedly been found susceptible to the attacks of the cotton root rot fungus (*Phymatotrichum omnivorum*) [R.A.M., xiii, p. 350]. The fungus has been isolated from the roots of dying watermelon vines, grown in pure culture on potato-dextrose agar, and inoculated under controlled conditions with positive results on Iowa King, Iowa Belle, Pride of Muscatine, and Black-seeded Klondike watermelons and Acala cotton seedlings in the laboratory and field.

The initial invasion of the host tissues is frequently effected by inter-cellular 'wedging' of several or many hyphae, but single hyphae were also able to enter between two epidermal cells or directly into a cell. The entrance of the fungus in the cases studied was just behind the

root cap, but older roots are also invaded. Penetration of the walls of living cells appears to be accomplished partly by pressure and partly by a softening of the membrane, probably through enzymatic action, at the point of contact. The mycelium in the host tissues is either intra- or intercellular, the latter condition being most in evidence at first.

In pure culture *P. omnivorum* is inhibited or destroyed by the presence of *Trichoderma lignorum* [cf. *ibid.*, xiv, p. 248], the mycelia of the two growing together without any trace of repellent action. After meeting, the growth of *P. omnivorum* ceased almost completely.

**CHAZE (J.) & SARAZIN (A.).** *Altération des constituants cytoplasmiques provoquée dans le Psalliote par parasitisme.*—[Modification of the cytoplasmic constituents induced by parasitism in *Psalliota*.]—*C.R. Soc. Biol., Paris*, cxix, 23, pp. 843–847, 3 figs., 1935.

The writers' observations on *Psalliota [campestris]* in the early stages of attack by *Mycogone perniciosa* [R.A.M., xiv, p. 674], showed that the chief modifications in the hyphae of the former are a pronounced vesiculization of the chondriome elements, the presence of a larger number of crystals, excessive vacuolar fragmentation in the cells in proximity to the hyphae of the parasite, and nuclear multiplication on a large scale, the average number of nuclei in diseased cells ranging from ten to twenty compared with two or more, rarely four, in healthy ones.

Of the phenomena herein described only the last would seem to be an exclusive result of parasitism by *M. perniciosa*.

**WARE (W. M.).** *Mushroom-growing in the United States.*—*J. Minist. Agric.*, xlii, 2, pp. 113–119, 2 pl., 1935.

The author gives a brief account of the recent developments in the mushroom-growing industry in the United States, nearly three-quarters of which is centralized in the State of Pennsylvania. Some interesting comparisons are made between the practices in use and the results obtained there and in Great Britain [R.A.M., xiv, p. 490]. While most of the fungal diseases of the crop are common to the two countries, *Xylaria vaporaria* [ibid., xiv, p. 346] and *Clitocybe dealbata* [ibid., xii, p. 611] are stated not to have been recorded so far in the United States, while *Pseudobalsamia microspora* [ibid., xii, p. 352] is unknown in England.

**HARGREAVES (E.).** *Entomological work.*—*Rep. Dep. Agric. S. Leone*, 1933, pp. 12–14, 1935.

It is mentioned in the course of this report that the dark-veined type of groundnut mosaic [one of three forms of the disease commonly confused under the term 'rosette' differentiated by the writer in the 1932 report of entomological work in Sierra Leone: cf. R.A.M., xii, p. 5] is transmissible by *Aphis laburni*, the symptoms appearing after an incubation period of twelve or thirteen days.

**VINAS (J.).** *Qualités à exiger du sulfure de cuivre comme anticryptogamique.* [Requisite qualities in copper sulphide used as a fungicide.]—*Rev. Vitic., Paris*, lxxxii, 2134, pp. 325–326, 1935.

After referring to the recent papers by Branas and Dulac on the

value of copper sulphide with or without a vanadium salt as catalyser [R.A.M., xiii, p. 714; xiv, p. 674] for the control of certain fungal diseases, e.g., vine mildew [*Plasmopara viticola*], the author states that the oxidizability of cupric sulphide depends much more on the method used in its preparation than on the presence of a catalyser, fineness of division being one of the chief factors in this regard. From the purely practical spraying standpoint it is further stated that finely divided particles of the substance take a very long time to be deposited, while colloidal solutions of the sulphide remain in suspension indefinitely. Contrary to Branas's and Dulac's opinion, he recommends that the prepared substance should be stored in dry powder form rather than in a damp condition, since the latter induces the formation of large crystals of copper sulphate. Vine-growers are recommended at present, only to make small-scale tests of copper sulphide sprays.

NIEMEYER (L.). **Die durch *Pseudomonas tumefaciens* (E. F. Smith et Townsend) Stevens verursachte Mauke der Weinreben.** [The Vine 'mauke' caused by *Pseudomonas tumefaciens* (E. F. Smith et Townsend) Stevens]—*Zbl. Bakt.*, Abt. 2, xcii, 4-7, pp. 116-162, 8 figs., 1 diag., 1935.

An exhaustive, tabulated account, supplemented by a six-page bibliography, is given of the writer's studies and observations (mostly in the Moselle, Saar, and Ruwer valleys) on the so-called 'mauke' disease of the vine caused by *Bacterium tumefaciens* [R.A.M., xi, p. 655].

A perusal of the relevant literature showed the first reference to the disorder to have been made by Hörter in 1822 in 'Der rheinländische Weinbau nach theoretisch-praktischen Grundsätzen für denkende Ökonomen.' I. Teil (128 pp., Koblenz). The symptoms as personally observed were found to agree in the main with the numerous descriptions that have been given of the disease, which does not appear, from information supplied by viticultural institutes, to be of appreciable economic importance in Germany. Among the chief contributory factors in the development of 'mauke' were found to be heavy, sticky soils, arrested growth from cold and hail injury, and drastic pruning, accompanied by an injudicious manuring scheme.

From tumours arising spontaneously and by inoculation, 115 strains of *Bact. tumefaciens* were cultured, 30 per cent. of which were capable of reproducing the symptoms, though their virulence was mostly of brief duration. The transmissibility of 'mauke' from vine to vine (by living and dead tissues and implements), from vine to tomato, from tomato to tomato, and from *Ricinus [communis]* to tomato was experimentally demonstrated. The importance of arrested growth of the host in the development of infection by *Bact. tumefaciens* was shown in the inoculation tests, in which under these conditions positive results were obtained as long as ten days after wounding. The longest incubation period of the organism in vines, apple seedlings, and *Pelargonium zonale* was nearly a year. The viability of *Bact. tumefaciens* persisted for 127 days in sand and for 54 in Devonian schist [cf. *ibid.*, v, p. 495].

Fifteen vines cultivated on a commercial scale in Germany reacted similarly, as regards size and rapidity of growth of the tumours, to inoculation with very virulent strains of the 'mauke' organism; in tests

with a miscellaneous assortment of strains the infection data were too unequal and irregular to permit of a clear-cut statement respecting resistance and susceptibility. Vigorously growing, well-nourished plants were generally the most susceptible to infection. Conflicting results were given by experiments in the control of the disease, none of the measures so far adopted against which has proved uniformly successful. In general, however, the vines recover spontaneously or may be freed from the excrescences by appropriate pruning.

LÁSZLÓ (S.). **Újabb adatok a szölő lisztharmatjának áttelepéséhez.**

[Recent contributions to the overwintering of *Oidium*.]—Rep. Hung. agric. Exp. Sta., xxxvii, 4–6, pp. 235–238, 1934. [German and French summaries.]

The perithecial stage (*Uncinula necator*) [R.A.M., xiii, p. 398] of *Oidium tuckeri* is stated to have been recognized in Hungary since 1893, between which year and 1927, however, it occurred only sporadically on European vines. In the autumn of the latter year the fungus developed in profusion, especially on American varieties and hybrids of Riparia or Rupestris extraction, and the perithecia were detected exclusively in groups of 15 to 45 on the galls formed by *Phylloxera* [*vastatrix*].

**Oversigt over Plantesygdomme. 207. Juli 1935.** [Survey of plant diseases.

207. July, 1935.]—St. plantepat. Forsøg, Kbh., 11 pp., 2 figs., 1935.

Among other items of interest in this report on the Danish phytopathological situation in July, 1935, are notes of H. R. Hansen on cereal, turnip, and potato diseases. Potato wart (*Synchytrium endobioticum*) was recorded from nine new localities [R.A.M., xiii, pp. 721, 799]. Potato leaves at Tylstrup bore dark spots on both sides caused by *Cercospora concors* [ibid., xiii, p. 288], an occasional, relatively innocuous pathogen of this host.

JONES (G. H.). **Egyptian plant diseases: a summary of research and control.**—Bull. Minist. Agric. Egypt, 146, 45 pp., 8 pl., 1935.

In this bulletin the author gives a general review of the investigations into plant diseases and their control carried out by the mycological section of the Egyptian Ministry of Agriculture during the last nine years [cf. R.A.M., v, p. 19]. The first part of the paper consists of notes on the geographical and physical characteristics of Egypt in relation to plant diseases, the most prevalent types of infection found, the lines upon which research has been conducted, the adaptation of control methods to local conditions, and legislation. In the second part the chief diseases occurring in Egypt [ibid., xi, p. 224] are listed under the common names of the hosts, with notes on their distribution, the losses caused by them, and their control. The paper concludes with a list of official publications on plant diseases issued by the Egyptian Ministry of Agriculture.

NATTRASS (R. M.). **Annual Report of the Mycologist for the year 1934.**—

Rep. Dir. Agric. Cyprus, 1934, pp. 45–49, 1935.

During the period under review wheat flag smut (*Urocystis tritici*) [R.A.M., xiv, p. 83] was again general in Cyprus, causing considerable

damage throughout the wheat-growing areas. The two Australian resistant wheat varieties, 'Geeralyng' and 'Nawaba' appear, from two seasons' observations, to be well suited to local conditions. A bacterial disease of wheat, probably identical with that caused by *Bacterium [Pseudomonas] tritici* [ibid., xii, p. 749], was observed in April for the first time; the affected plants showed twisting of the leaves, an exudation of yellow bacterial slime between the glumes and between the stems and sheaths, and produced no grain.

Heavy attacks of potato powdery mildew (*Oidium* sp.), first reported in Cyprus in 1933, occurred in June. An extensive survey failed to reveal the presence of onion smut (*Urocystis cepulae*) [ibid., xiii, p. 473] in Cyprus, though two undetermined species of *Urocystis* occur on wild *Allium*.

Oak trees in the Polis district were heavily attacked by a 'tar spot' identified at the Imperial Mycological Institute as *Trabutia quercina* (Fr. & Rud.) Sacc. & Roum. An undetermined species of *Naemospora* apparently caused the death of large numbers of *Populus nigra* trees; the fungus was also found attacking the walnut, alder, and hazel. *Pistacia* trees were heavily attacked by *Uromyces terebinthi* [ibid., viii, p. 339].

Wastage of Cyprus oranges on arrival at Covent Garden was almost entirely due to species of *Penicillium*; the amount of infection present increased as the season advanced. *Sclerotinia sclerotiorum* caused a rot of lemon fruits and a fungus with dilute brown, 1-septate pycnospores measuring 4 to 10 by 3 to 4  $\mu$  caused a twig die-back of the same host; it was identified at the Imperial Mycological Institute as *Diplodia (Microdiplodia) warburgiana* Reichert. Inoculation experiments on lemon trees in the open with the *Dothiorella* previously isolated from lemons affected with gummosis showed that the fungus is an active parasite, causing severe gummosis and large cankers. Lemon fruits attached to the tree were rapidly rotted by the fungus which worked down the fruit stalk and formed a canker at the junction of the stalk and twig.

Of four strains of cowpea, viz. Brabham, Victor, Iron, and Groot, resistant to *Uromyces vignae* [ibid., xiv, p. 614] introduced from the United States, the first-named gave the largest yield and the most vigorous plants; the last was discarded as too susceptible to attack by nematodes and *Macrophomina phaseoli* [ibid., xi, p. 711].

VAN DER GOOT (P.) *Ziekten en plagen der cultuurgewassen in Nederlandsch-Indië in 1933.* [Diseases and pests of cultivated crops in the Dutch East Indies in 1933.]—*Meded. Inst. PlZiek., Buitenz.*, 84, vii + 79 pp., 1935.

The following are among the many items of interest in this report, prepared on the usual lines [R.A.M., xiv, p. 152]. Citrus scab [*Sporotrichum citri*] on rough lemon, Japanese citron, Cleopatra mandarin, and other varieties in Batavia was reduced to a minimum by regular applications of 1.5 per cent. Bordeaux mixture [ibid., xiv, p. 692]. Heavy damage was caused in citrus groves by *Fusarium (Nectria haematococca)*, the attacks of which were apparently favoured by the practice of interplanting with kapok [*Eriodendron anfractuosum*].

A species of *Cercospora* causing leaf and stem rot was responsible for

the failure of the *Chrysanthemum coronarium* crop in Priangan, Java, while pyrethrum (*C. cinerariifolium*) was severely injured during the rainy season by *Sclerotium rolfsii*.

In the Japara-Rembang Residency root rot of rice [ibid., xiii, p. 687] was more widespread than in the previous year, occurring over an area of 2,705 as compared with 1,619 hect.; the corresponding figures in Soerabaja were 6,013 as against 5,723 hect. in 1932.

The *Phytophthora* foot rot of pepper [*Piper nigrum*] in the Bengkajang and Singkawang subdivisions of West Borneo again assumed an epidemic form, and was also a source of heavy losses in the south and east of the island [ibid., xiv, p. 152].

*Hevea* rubber mildew [*Oidium heveae*: ibid., xiv, p. 331] was prevalent in West Java, where treatment on a limited scale has been instituted, but caused relatively little injury in the central regions. The most important bark disease in the Besoeki district is stated to be stripe canker [*P. palmivora*: ibid., xiii, p. 470], susceptibility to which was found to be a specific property of the clones. Mouldy rot [*Ceratostomella fimbriata*] spread very widely in 1933, and a bark canker (foot rot) affected five- to eight-year-old grafted trees at the junction of stock and scion. Infection by the latter was not readily discernible in the early stages, and below the bark decay was generally more advanced than the external symptoms suggested. Spontaneous healing took place in some plantations. *Xylaria thwaitesii* [ibid., x, pp. 126, 525] was observed on a number of coffee trees in a Central Java plantation. Top die-back (*Rhizoctonia* sp.) [ibid., xiv, p. 152] was for the first time definitely ascertained to be present in Malang. In Sumatra the disease occurred mainly in Moeara Laboeh, its purely sporadic development in the Ophir plantations being possibly limited by the more intensive tillage. The so-called 'bark-splitting' disease, of undetermined origin, appears to be gradually gaining ground in older plantations.

The P.O.J. 2967 sugar-cane variety appears to be very susceptible to mosaic without, however, suffering from the disease to any extent [ibid., xiii, p. 654]. The fields may be kept practically free from infection by strict attention to the health of the canes at the swarming time of *Aphis maydis*. Pokkah-boeng (*F. moniliforme*) [*Gibberella moniliformis*: ibid., xiv, pp. 153, 709] was favoured by the wet season, especially in West Java, and was also very prevalent in East Cheribon. Leaf scald [*Bacterium albilineans*: ibid., xiii, p. 686] was of restricted extent; P.O.J. 2967 seems to be rather susceptible to this disease also.

*Pythium aphanidermatum* caused at least as much damage in the Besoeki tobacco seed-beds as *Phytophthora* [*parasitica nicotianae*: ibid., xiv, p. 533]. The *Pythium* stem scorch, which causes such heavy damage in Deli (Sumatra) [ibid., xiii, p. 328] some three weeks after transplanting, has only once been observed at this stage in Besoeki.

DEMOLON (A.) & DUNEZ (A.) *Recherches sur le rôle du bactériophage dans la fatigue des Luzernières.* [Investigations on the part played by the bacteriophage in the exhaustion of Lucerne fields.] —*Ann. Agron., Paris, N.S., v, 1; pp. 89-111, 8 figs., 1935.*

The authors give details of laboratory and field experiments at Versailles, the results of which are interpreted to indicate that in many

instances the failure of lucerne fields of some years' standing is in great part due to the destruction of the nodule organism (*Bacillus radicicola*) by its bacteriophage [R.A.M., v, p. 756] the presence of which, throughout the whole layer of soil penetrated by the lucerne roots, was conclusively established. Reinfection of the soil with the nodule organism occurs normally from the surface, but in heavy clay soils it progresses in depth very slowly; this may be remedied by resowing such exhausted soils with lucerne seed artificially inoculated with active cultures of the nodule organism, the isolation and culture of which on artificial media are discussed.

DUFRÉNOY (J.). **La bactériophagie en agronomie tropicale.** [Bacteriophagy in tropical agronomy.]—*Rev. Bot. appl.*, xv, 167, pp. 497-506, 1935.

After referring to the investigations of various workers on the bacteriophage of *Bacterium malvacearum* [R.A.M., xiii, p. 697], *Bact. tabacum* [ibid., xiv, p. 154], *Pseudomonas* [*Bact.*] *tumefaciens* [ibid., xiii, p. 152], and of some other organisms, the author gives a brief account of the methods for its isolation, and also for increasing its virulence to the bacteria. He considers that these studies open up new horizons in the investigation of the causes of many hitherto inexplicable crop failures [see preceding abstract].

ARK (P. A.). **Filtrability of certain plant pathogenic bacteria.**—*Phytopathology*, xxv, 7, pp. 728-729, 1935.

Evidence is briefly presented of the capacity of *Erwinia amylovora* [*Bacillus amylovorus*: R.A.M., xiv, p. 702], cultured in tubes of skimmed milk at 28° C., to traverse Berkefeld V and N and Chamberland L<sub>3</sub> filters after an incubation period of 7 to 36 days. Similar results were obtained with *E. [B.] carotovorus* [ibid., xiv, pp. 698, 730, and below, p. 807], in the case of which, however, no filterable forms developed where the degree of acidity reached P<sub>H</sub> 6.6. Hydrogen-ion concentration of the medium, therefore, may be a limiting factor in this phenomenon. Neither organism produced a filterable stage in bouillon.

THOROLD (C. A.). **Diseases of cereal crops in Kenya Colony.**—*Bull. Dept. Agric. Kenya* 2 of 1935, 66 pp., 16 pl., 1 fig., 1935.

In this valuable bulletin a concise, semi-popular account is given of the more important bacterial and fungal diseases in Kenya of maize (including streak), wheat, oats, barley, rye, sorghums (*Sorghum* spp.) and bulrush millet (*Pennisetum typhoideum*), together with a brief discussion of control measures. Numerous bibliographical references are appended to the descriptions of the individual diseases.

SPRAGUE (R.). **A preliminary check list of the parasitic fungi of cereals and other grasses in Oregon.**—*Plant Dis. Repr*, xix, 11, pp. 156-186, 1935. [Mimeographed.]

The immediate purpose of this preliminary list of cereal and other grass pathogens occurring in Oregon is to facilitate ready reference to all known diseases of the crops liable to be used in rotation with

cultivated cereals. In the nomenclature of the grasses, Hitchcock's standardized usage has been followed (*Misc. Publ. U.S. Dept. Agric.*, 200, 1935). Arthur's recent manual [*R.A.M.*, xiii, p. 728] was used in the identification of the rusts, supplemented by Jackson's list of Oregon Uredinales (*Mem. Brooklyn bot. Gdn.*, i, p. 198, 1918). The genus *Septoria*, represented on a large number of local hosts, is now being studied by the writer, who prefers to withhold final determinations of most of these species for the time being.

**HANNA (W. F.) & POPP (W.). Experiments on the control of cereal smuts by seed treatment.**—*Sci. Agric.*, xv, 11, pp. 745-753, 1935. [French summary.]

The authors give a brief tabulated account of field trials from 1930 to 1934, inclusive, at Winnipeg, to test the efficacy of 16 seed disinfectants in the control of wheat bunt (*Tilletia levis* and *T. tritici*) [*T. foetens* and *T. caries*], covered smut of barley (*Ustilago hordei*), and covered and loose smuts of oats (*U. levis* [*U. kollerii*] and *U. avenae*). Formalin (1 in 320 as a sprinkle) gave good control of all the five fungi, but under certain conditions it caused seed injury, besides being more difficult to apply than the dust treatments. The copper dusts tested (including copper carbonate, monohydrated copper sulphate, and basic copper chloride) controlled wheat bunt when the seed-grain was not too heavily contaminated with spores, and also gave good results with hull-less oats. Satisfactory control of wheat bunt, barley covered smut, and oats smuts was obtained with new improved cerasan [*R.A.M.*, xiv, pp. 221, 688], containing 5 per cent. ethyl mercury phosphate, and this dust, owing to the light rate at which it is applied ( $\frac{1}{2}$  oz. per bush.) should not cause clogging of the drills. In a series of experiments, which are not reported in detail in this paper, there was evidence that seed treated with copper and mercury dusts gave a higher percentage of seedling emergence than untreated seed.

**VONG-MAY (C.) & CHAN-TSI (W.). Experiments on the control of cereal smuts by the hot-water treatment.**—*Agric. Sinica*, i, 7, pp. 189-238, 3 pl., 1 fig., 4 graphs, 2 diag., 1935. [Chinese, with English summary.]

A study since 1933 in China of the hot-water treatment against cereal smuts showed that barley covered smut (*Ustilago hordei*) and wheat bunt (*Tilletia tritici* and *T. levis*) [*T. caries* and *T. foetens*] can be entirely controlled by treatment with water at a temperature not below 57° C. for a period of not less than five minutes. Loose smut of barley [*U. nuda*] was not eradicated by treatment of the seed for 30 minutes at 56° or 3 minutes at 60°, but was easily controlled by a modified form of the treatment, comprising presoaking in cold water for 3 minutes and transferring to water at 50° for 5 minutes (3-50-5 formula). Loose smut of wheat [*U. tritici*] was prevented only by the modified treatment; there was no significant difference between the amount of infection in the untreated controls and that in plots where the seed had been treated for 1 to 30 minutes at 52° to 60°. The data obtained showed that in the modified treatment, as the temperature of the water was raised, so the presoaking and immersion periods could be reduced, and

vice versa, treatments with the formulae 3-58-5, 6-54-5, 8-52-5, 3-56-10, and 6-52-10 all preventing infection. The formulae 3-56-5, 3-52-10, 6-52-10, and 24-50-5 controlled the strain on Wutsin-Awnless wheat grown in Nanking, but not that on Lungtsin from Hang-chow, which required more intensified treatments.

The germination capacity of wheat seed was not impaired by direct immersion in water at a temperature below 54° for a period not exceeding 20 minutes, or below 60° for a period not over 7 minutes. With some wheats, such as Wuchang 136 and Nanhsuchow, and some barleys, such as Tuchang and Hsiapu, germination was unaffected or slightly increased by the modified treatments, while with others, such as C.U. Quality and Wutsin-Awnless wheats and C.U. 158 and C.U. 103 barleys, germination was markedly reduced.

**STELZNER (G.). Einfacher Nachweis von Hyphen parasitärer Pilze im Halm der Gramineen.** [A simple method of detecting parasitic fungous hyphae in the haulms of Gramineae.]—*Phytopath. Z.*, viii, 4, pp. 369-372, 5 figs., 1935.

Details are given of a method for the examination of the haulms of Gramineae infected by parasitic fungi. The stalks should be cut about 4 cm. above and 1 to 2 cm. below the node, split into two or three longitudinal sections, thoroughly washed, fixed in absolute alcohol, stained either with cotton blue or (for specifically cytological purposes) haematoxylin, and thin sections of the parenchyma tissue transferred to glycerined slides.

Brief descriptions are given of the mycelia of *Helminthosporium gramineum* [R.A.M., xiv, p. 27] and certain cereal smuts in the tissues of their hosts. In the case of *Ustilago avenae* on oats gemmae, as observed by Arland in the flowers [ibid., iv, p. 158], were detected in the haulm. This technique has further been found suitable for the study of latent infection in the Gramineae [ibid., xii, p. 209].

**FISCHER (G. W.). Comparative studies of certain cultures of Puccinia rubigo-vera and Puccinia tomipara on wild grasses.**—*Phytopathology*, xxv, 7, pp. 657-685, 1 fig., 2 diags., 1935.

A comprehensive, tabulated account is given of a series of comparative inoculation experiments at the State College of Washington with nine cultures of *Puccinia rubigo-vera* [R.A.M., xiii, p. 185] from Michigan, Indiana, Ohio, and Kansas and one of *P. tomipara* Trelease (*Trans. Wis. Acad. Sci. Arts Lett.*, vi, p. 106, 1885) from Michigan on 111 collections of species and varieties of wild grasses. The latter is treated by Arthur [R.A.M., xiii, p. 728] as a synonym of *P. rubigo-vera*, whereas Mains [ibid., xii, p. 499] accords it specific rank.

The resultant data showed the nine cultures of *P. rubigo-vera* to be physiologically distinct on the basis of the infection type induced by eight of them on *Agropyron*, *Elymus*, *Hordeum*, and *Hystrix* spp., and one on *Bromus* spp., while some were further differentiated by specialization on their aecidial hosts. For instance, two cultures produced aecidia on *Clematis virginiana*, three on *Impatiens biflora*, one on exotic species of *Thalictrum* (*T. minus*, *T. glaucum*, *T. flavum*, and *T. fendleri*), and one on the two native species of this genus, *T. dioicum* and

*T. dasycarpum*. *P. tomipara* was successfully inoculated into the above-mentioned species of *Thalictrum* (except *T. minus*), but only three of the 26 species of *Bromus* used in the tests proved highly susceptible to this rust, viz., *B. altissimus*, *B. ciliatus* (on both of which it occurs naturally in the field), and *B. purgans*.

Marked intraspecific reactional differences were observed between various wild-grass collections inoculated with the several cultures of *P. rubigo-vera*, a fact that emphasizes the necessity of using grasses of recognized genetic constitution in experiments of this nature. The degree of specialization presented by *P. rubigo-vera* is stated to be comparable to that characteristic of the races of cereal rusts. Certain cultures were found to differ considerably in spore measurements, especially in their mean uredospore width, the range for the species as a whole being 15 to 23  $\mu$ , but modes differed from 17 to 22  $\mu$ . The mean teleutospore width also varied, the range being 8 to 21  $\mu$ , whereas two cultures had mean diameters of 10.77 and 10.67  $\mu$ , respectively. The relative sizes of uredospores and teleutospores were not necessarily correlated and no relationship could be traced between spore size and host specialization.

The multicellular character of the teleutospores of *P. tomipara* remained constant through two generations, thereby establishing, in the writer's opinion, the claim of this rust to specific rank.

**HART (HELEN) & FORBES (I. L.). The effect of light on the initiation of rust infection.** *Phytopathology*, xxv, 7, pp. 715-725, 1 fig., 1935.

The writers discuss and tabulate the results of controlled experiments at the Minnesota Agricultural Experiment Station to determine the effect of light and darkness on the entry of the uredospore germ-tubes and subsequent development in the hosts of *Puccinia triticina* physiologic form 53, *P. graminis tritici* forms 21 and 49 [ibid., xiv, p. 687] on various wheat varieties, *P. antirrhini* on *Antirrhinum majus* [ibid., xiv, p. 498], *P. coronata* [*P. lolii*] on oats [ibid., xiv, pp. 567, 625], *P. helianthi* on sunflower [ibid., xii, pp. 318, 571], *P. sorghi* [*P. maydis*] on maize [ibid., xiv, p. 438], and *Uromyces appendiculatus* on beans (*Phaseolus vulgaris*) [ibid., xiv, p. 734].

Darkness at the time of inoculation and throughout the early stages of infection was found to diminish the prevalence and intensity of the symptoms induced by *P. graminis tritici* [ibid., xii, p. 498], especially on the susceptible Marquis, and *U. appendiculatus*, but did not affect the course of the disease in the case of *P. triticina* and *P. antirrhini*. The incidence of attack by *P. maydis* and *P. helianthi* was also reduced by darkness, which further slightly modified the severity of the symptoms, though not sufficiently to place the bulk of the plants in the 'light infection' class. The prevalence of infection by *P. lolii* on Gopher oats was not affected by darkness, which did, however, somewhat mitigate the severity of the attack on Victory.

**SCHILCHER (E.). Beitrag zur Rostfrage. (II. Mitteilung.)** [A contribution to the rust problem. (Note II.)]—*Z. PflKrankh.*, xlvi, 6-7, pp. 316-335, 4 graphs, 1 map, 1935.

Further studies from 1932 to 1934 on physiologic specialization in

brown rust of wheat (*Puccinia triticina*) in Austria [R.A.M., xiii, p. 83] showed form XIII to be most widely distributed, followed by XV [ibid., xiv, p. 227], whereas XIV, XVI, and XX occurred sporadically and XXI was represented only in one Austrian and one Hungarian collection [ibid., xiii, p. 755]. All the 28 wheat varieties tested for their reaction to the six above-mentioned biotypes of *P. triticina* were more or less severely attacked by the several physiologic forms. Field observations during the period under review showed that the date of onset of *P. triticina* and *P. glumarum* may vary by as much as one month [cf. ibid., xiv, p. 500] according to the prevailing meteorological conditions, early invasion being mostly followed by heavy attacks, while pustule formation is relatively scanty in the case of late infection. Even ordinarily susceptible varieties may assume an appearance of resistance in years unfavourable to rust development.

BOCKMANN (H.). **Über die Halmbruchkrankheit des Weizens.** [On the straw-breaking disease of Wheat.]—*Dtsch. landw. Pr.*, lxii, 30, p. 369, 1935.

Following up his recent observations on the factors involved in the etiology of lodging of wheat (*Cercospora herpotrichoides*) in Schleswig-Holstein [R.A.M., xiv, p. 689], the writer seeks to reconcile the apparently conflicting evidence as to the frequent losses from this disease among crops following the admittedly resistant Leguminosae. The explanation apparently lies in the ability of the fungus to persist on stubble refuse from the crop preceding the leguminous one. Care should thus be taken, not only to plough the stubble deeply under the soil immediately after harvesting, but also to avoid bringing it to the surface in the course of the next season's ploughing. Luxuriance of growth in the host is considered to be an important factor in the extent of the damage from this disease.

SIMMONDS (P. M.), RUSSELL (R. C.), & SALLANS (B. J.). **A comparison of different types of root rot of Wheat by means of root excavation studies.**—*Sci. Agric.*, xv, 10, pp. 680-700, 9 figs., 1935. [French summary.]

A tabulated account is given of the authors' comparative studies in 1933 and 1934 at Indian Head, Saskatchewan, of the root systems of healthy wheat (Marquis) plants and of plants affected with common root rot (*Helminthosporium sativum* and *Fusarium* spp.) [R.A.M., xiv, p. 688], take-all (*Ophiobolus graminis*) [ibid., xiv, p. 689], and browning root rot (*Pythium* spp.) [ibid., xi, p. 294]. Common root rot is characterized by brown lesions in the subcoronal internodes and roots of seedlings, which spread by mid-season to the crown and basal leaf sheaths. By the time the healthy plants were nearly mature severe lesions were abundant on the basal parts of diseased plants. Both roots and tops of mature plants are stunted and the yield was only 70 per cent. of the normal.

Take-all causes dark brown or black lesions on the roots and subcoronal internodes of seedlings. The seminal root system is almost completely destroyed by mid-season and is quite dead by the time the crop is ripe. The tops are greatly stunted and almost completely

bleached; the heads were either empty or partially filled with shrunken grain and the yield from diseased plants was only 20 per cent. of that of healthy ones.

Browning destroyed many of the lateral seminal rootlets and many of the crown roots, with the result that most of the leaves died and the seedlings became markedly stunted. Partial recovery followed, due to the continued growth of the seminal roots and of the few crown roots that escaped destruction, but the plants remained greatly stunted and the yield only amounted to 20 per cent. of the normal.

The results of the investigation indicated that the damage caused is approximately proportional to the portion of the root system destroyed, and that the losses from light infections often pass unnoticed, though they are quite considerable in the aggregate. Severe amputation of the seminal root system, whether caused by mechanical means [*ibid.*, xii, p. 501] or by parasitic fungi, tends to reduce the number of tillers and to retard the maturity of the wheat plant, while severe amputation of the crown roots hastens maturity.

**ULLSTRUP (A. J.). Studies on the variability of pathogenicity and cultural characters of *Gibberella saubinetii*.**—*J. agric. Res.*, li, 2, pp. 145-162, 6 figs., 2 diags., 1935.

An account is given of the author's studies of the variations occurring under controlled conditions in the pathogenicity and cultural characters of lines of *Gibberella saubinetii* [*R.A.M.*, xiv, p. 720] originally derived from single ascospores isolated [by a method which is described] in sets of eight from the ascospores of a single ascus, or from the tips of the germ-tubes produced by the ascospores; the perithecial material used was collected in 1933 from barley fields in Illinois, Iowa, and Minnesota. The results showed that all the original cultures were strikingly similar in their behaviour irrespective of the locality from which the perithecia had been collected, while considerable variations occurred in the subsequent subcultures, most of which were made from single conidia. The variations were more or less haphazard, and did not appear to be caused by an orderly segregation within the ascus. Subcultures also differed widely in the ability to cause seedling blight of maize, some being highly virulent while others were practically non-pathogenic. The virulent cultures were always characterized by a rapid radial growth and an abundance of aerial mycelium, while the non-virulent cultures grew relatively slowly and exhibited a pionnotes type of growth. No correlation could be established between abundant conidial production and degree of pathogenicity. Passage during one season through the host did not appear to have any influence on the cultural characters of the isolates.

The investigation is considered to suggest that the variability observed may be due either to abnormal nuclear divisions with subsequent reassortment and segregation of a new nuclear complex, or to the existence of true mutants.

**BEVILACQUA (I.). La micosi del Grano.** [The Wheat mycosis.]—*Istria agric.*, N.S., xv, 14, pp. 317-319, 1935.

In 1935, wheat growing near Trieste was very severely damaged

owing to infection by *Dilophia graminis* [R.A.M., iv, p. 150; x, p. 75], most of the ears being affected before they had become freed from the leaf sheaths. Control measures comprise cutting the wheat high, burning the stubble, and disinfecting the seed with Caffaro powder.

**VILKAITIS (V.). Apie Rudųju rūdžiu, Puccinia dispersa Erikss., žiemojima.** [The overwintering of brown rust of Rye, *Puccinia dispersa* Erikss.]—Reprinted from *Annu. Acad. Agric. Dotnuva*, ix, 10 pp., 1935. [Lithuanian, with French summary.]

Differences were observed in the extent of brown rust (*Puccinia dispersa*) [*P. secalina*] infection on rye sown at various dates in the autumn of 1934 in Lithuania, the highest incidence occurring among the sowings made on 5th September, slight infection in those made on 6th October, and none in those of 16th October [R.A.M., xiv, p. 689]. Lochows Petkus rye was successfully inoculated in the laboratory with uredospores brought from plants of the same variety in the field up to 20th February, 1935, whereas negative results were given by similar tests in March, at which time it is already becoming difficult to detect the uredospores on outdoor plants. With uredospores collected on 26th December the writer obtained 9.9 per cent. infection on laboratory plants inoculated on 9th April, 104 days later, while small amounts of rust also developed from inoculations made on 30th April and 20th May, 125 and 145 days, respectively, after collection. On the basis of these results the author concludes that *P. secalina* overwinters and probably persists throughout the year in the form of uredospores, although from the beginning of spring up to earing of the rye these spores are difficult to find [ibid., viii, pp. 362, 707, cf. also xiv, p. 499].

**DAVIS (G. N.). Some new aspects of Maize smut.**—*Iowa St. Coll. J. Sci.*, ix, 3, pp. 505-507, 1935.

Inoculations at the spiral whorl of maize plants with a spore suspension of maize smut [*Ustilago zeae*: R.A.M., xiv, p. 436] in various decoctions gave the best results when 1 per cent. fish oil soap-carrot decoction, which had the lowest surface tension, was used (92.3 per cent. infected plants with galls on 69.2 per cent.). Reputedly very resistant plants produced up to 30 per cent. infection when inoculated with spores in this decoction. Many small galls, not large enough to rupture the leaf sheaths, were found at the nodes, indicating that the leaf sheath should be removed when varieties are tested for smut resistance.

Since nodal infections appear late in the season and often in times of drought it was suspected that smut mycelium may lie dormant in the axillary buds for a long period; and evidence is adduced to this effect from a series of experiments during 1931 to 1934, in which inoculated and non-inoculated plants were injured about the middle of August, by the removal (a) of the tops, (b) of the ears, and (c) of the tops and ears. This treatment induced the development of the axillary buds and resulted, in the non-inoculated plants, in increases of 0, 23.3, and 45.1 per cent. nodal smut galls, respectively, over the controls, whilst the inoculated gave increases of 20.4, 15.6, and 31.7 per cent., respectively. Furthermore, histological examination of 262 axillary buds showed 140 to be infected, indicating that a large number of infected buds never

produce smut galls. On the basis of these results the author concludes that the maize smut infects the host at an early stage of development and that stimulation of the axillary buds, which is very marked in dry years, occasions a corresponding development of nodal smut boils as a result of this activity.

McNEW (G. L.). **Preliminary studies on the effect of filtrates from cultures of *Diplodia zeae* upon seedling blight of Maize.**—*Iowa St. Coll. J. Sci.*, ix, 3, pp. 481–487, 1935.

Maize seedlings grown from seed severely infected by *Diplodia zeae* [R.A.M., xiv, p. 437] were found to develop less blight when the seed had been immersed before planting in a cultural filtrate of the pathogen (passed through a Berkefeld 'W' filter) than when it had not been so treated. This result appeared to be independent of the kind of culture media used, but it was necessary for the fungus to have passed the period of active growth before the filtrate became effective. The influence of the filtrate on emergence was pronounced at 16° C., but very slight at higher temperatures. The filtrate did not prevent infection by stimulating abnormally rapid plant growth or by completely preventing fungal growth. The beneficial component in the filtrate being thermostable and non-volatile, it was possible partially to purify it by distilling off the volatile fraction, which was slightly toxic to the plants.

REDDY (C. S.). **Relation of rate of planting to the effect of Corn seed treatment.**—*Iowa St. Coll. J. Sci.*, ix, 3, pp. 527–538, 4 graphs, 1935.

Experiments conducted from 1930 to 1934, inclusive, in Iowa to ascertain the influence exerted by density of stand on the results of seed dust treatment of maize either practically disease-free or moderately infected with *Diplodia* [zeae: R.A.M., ix, p. 521], *Gibberella* [saubinetii], or *Basisporium* [Nigrospora sp.: ibid., xiii, p. 299; xiv, p. 437] demonstrated that artificial thinning by injuring the yield may introduce an uncontrolled factor into seed treatment tests. A study of the relationship of field stands to yields showed that stands and yields are positively correlated up to a certain point, but beyond this point of most production (which varied from 7,000 plants per acre in 1930 to 13,000 in 1931) the higher the stand the lower the yield. Increased yields were recorded as a result of seed dust treatment in stands lower than the most productive, the increased yields being 4.4, 3.3, 2.7, and 1.1 bushels per acre, whereas in stands higher than the most productive the effect of seed treatment was to alter the yield by 2.5, -1.3, 1.9, and -0.7 bushels per acre. These latter figures show two significant increases, while the decreases are not significant, so that the plants from the treated diseased seed were more productive than those from the untreated diseased seed. Seed treatment killed, inhibited, or delayed fungal action, the data strongly indicating that the result of the treatment was not confined to its effects on the stands.

WELLHAUSEN (E. J.). **Genetic investigations of bacterial wilt resistance in Corn as caused by *Bacterium stewarti* (Smith) Migula.**—*Iowa St. Coll. J. Sci.*, ix, 3, pp. 539–548, 1 pl., 1 diag., 1935.

A study of the inheritance of resistance to bacterial wilt of maize (*Bacterium* [*Aplanobacter*] *stewarti*) [R.A.M., xiv, p. 503 and next

abstracts] made with 56 inbred lines and certain single crosses submitted to artificial wound inoculations showed that most of the field maize inbred lines were resistant, most of those of the Evergreen group were intermediate, and most of the early sweet corn inbred lines were susceptible. Dominance of resistance was found in all the  $F_1$  material tested; in a few cases the  $F_1$  individuals were more resistant than the parents. The results of the back-cross and later generation progenies of the crosses OSF  $\times$  WF and OSF  $\times$  W-134 showed definite segregation of factors for resistance with a strong indication that two major dominant complementary genes, with perhaps a third modifying one, were involved.

Histological investigations showed that in very resistant seedlings about 10 per cent. of the bundles became infected shortly after inoculation, whereas after two months only very seldom was such infection seen. Reaction to invasion varied in susceptible lines and certain inbreds showed a modified development of the bundle following infection of the protoxylem, the parenchyma cells around which were replaced by heavily lignified cells radiating in all directions. This condition was not found in the most susceptible W-134, which may partly account for its readiness to wilt after infection.

**MAHONEY (C. H.) & MUNCIE (J. H.). Is resistance to bacterial wilt in Sweet Corn heritable?**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 458-473, 1935.

A tabulated account is given of the writers' experimental studies in Michigan on the inheritance of resistance to bacterial wilt (*Phytomonas [Aplanobacter] stewarti*) [see preceding and next abstracts], the results of which showed that hybrid varieties tend to be equally susceptible in the field with open-pollinated types of comparable maturity date. Attempts to correlate wilt percentage with maturity, yield, and seedling infection gave negative results, as did also various other genetical investigations. Arising out of the data obtained in 1933-4 is the problem of what constitutes resistance of maize to bacterial wilt in the field, i.e., whether it is a true, inherent resistance or due to tolerance of the organism or merely ability to escape attack under favourable environmental conditions. Both the two last-named types of resistance appear to exist, the incidence of infection among the early varieties in a given season being largely determined by the weather (disease escape), while an innate capacity to withstand the disease ensures the survival of a sufficient number of late-maturing individuals to produce a fair crop (disease tolerance). The only strains in these tests showing really low percentages of infection were markedly vigorous hybrids, of which one parent was an inbred of a cross between Evergreen sweet corn and Reid's yellow dent field maize.

**ELLIOTT (CHARLOTTE). Dissemination of bacterial wilt of Corn.**—*Iowa St. Coll. J. Sci.*, ix, 3, pp. 461-480, 4 pl., 1935.

After referring to the unprecedented severity of the outbreaks of maize bacterial wilt (*Aplanobacter stewarti*) that occurred in the United

States in 1932 and 1933 [*R.A.M.*, xiii, p. 571 and preceding abstracts], the author briefly reviews the history of the disease and states that evidence has been obtained indicating that *A. stewarti* probably overwinters in the flea-beetle (*Chaetocnema pulicaria*), found by Rand to carry the disease to large percentages of maize plants. Isolations from 175 overwintered adult beetles collected in April 1934 showed the wilt organism to be present in 19 per cent. In the summer of 1934 *Euchlaena mexicana* plants growing in the field in Maryland showed natural infection by *A. stewarti*.

**MATTHEWS (I.). The zinc sulphate treatment for mottle leaf of Citrus trees in the Sundays River Valley. Progress report.**—*Citrus Grower, 1935*, 41, pp. 30-32, 1935. [Afrikaans translation.]

The incidence of mottle leaf on Navel and Valencia oranges in the Sundays River Valley, Pretoria, is stated to have been reduced from between 50 and 80 per cent. to a minimum by the zinc sulphate treatment [*R.A.M.*, xiv, p. 628] which has been applied since 1933. The compound may be given either as a soil application at the rate of 8 lb. per tree in a strip of 18 to 24 in. round the trunk, or as a spray consisting of 10 lb. zinc sulphate (23 to 25 per cent. zinc), 5 lb. hydrated lime,  $\frac{1}{2}$  lb. spreader, and 100 gallons. water.

**FINCH (A. H.), ALBERT (D. W.), & KINNISON (A. F.). Progress on the control of Citrus chlorosis or decline.**—*Proc. Amer. Soc. hort. Sci. 1934*, xxxii, pp. 20-23, 1 fig., 1935.

The symptoms of citrus chlorosis in Arizona are briefly described and notes given on experiments in its control by the insertion of ferric citrate through holes in the trunks, soil applications of ferrous sulphate, and other less generally satisfactory methods of applying iron to the trees [*R.A.M.*, xiv, p. 561]. This disorder, which appears to be undoubtedly related in some way to iron metabolism, is stated to affect over twenty different plants in the State. In citrus the first symptoms usually appear at an age of 8 to 12 years and are most conspicuous at 18 to 20.

**MENCHIKOWSKY (F.) & PUFFELES (M.). The ratio of Ca, Mg : K, Na, and the chlorosis of Grapefruit trees in the Jordan Valley.**—Reprinted from *Hadar*, viii, 6, 14 pp., 1935.

Chemical investigations on the chlorosis of grapefruit occurring in plantations at the Agricultural Experiment Station, Jericho, showed that this disease could not be attributed to the chlorine present in the soil or irrigation water, to the absence of iron or magnesium, or the presence of boron in the soil. Abnormally low ratios of  $K_2O + Na_2O$  to  $CaO + MgO$  were found in the soil of affected plantations (e.g., 0.098 as against 0.128 normally) and in the ash of leaves from affected trees (e.g., 1.519 as against 2.490), and the authors conclude that the disease is the result of disturbed metabolism consequent upon these soil conditions, which furthermore increase the sensitivity of the trees to chlorine.

WAGER (V. A.). **Bleaching Citrus fruits for the removal of the sooty blotch blemish.**—*Citrus Grower*, 1935, 40, pp. 42-46, 1935. [Afrikaans translation.]

Details are given of laboratory experiments in the control of sooty blotch of Navel oranges (*Gloeodes pomigena*) in South Africa [R.A.M., xiii, p. 437], from which it appears that excellent results were obtained with eusol (chloride of lime and boracic acid) at 1 oz. to 1 lb. per gall. of water, the treatment at the two lowest concentrations requiring three and five minutes, respectively, while at the three higher ones it occupied only half a minute. The fruit thus treated was of an even brighter and more attractive appearance than that immersed in chloride of lime alone, though the latter was well up to standard.

BAKER (R. E.). **Citrus fruit-rots in Trinidad.**—*Trop. Agriculture, Trin.*, xii, 6, pp. 145-152, 2 graphs, 1935.

As a result of investigations during the 1934-5 season the author states that rotted grapefruit was hardly ever found on the trees in Trinidad, unless the fruit had been mechanically injured by some external cause. In storage, wastage of grapefruit, apart from that due to chilling or desiccation, was chiefly caused by *Botryodiplodia theobromae* [cf. R.A.M., xiii, p. 456], *Penicillium digitatum* [ibid., xiv, pp. 182, 577], and *Colletotrichum gloeosporioides* [ibid., xiv, p. 183], while rots caused by other fungi, including *Phomopsis* [*Diaporthe*] *citri* [ibid., xiv, p. 182], *Dothiorella* [*Botryosphaeria*] *ribis*, *Penicillium italicum* [loc. cit.], and others, occurred very occasionally. The fact that *Phytophthora parasitica* and *P. palmivora* [ibid., xiv, pp. 506, 692] have never been observed to cause wastage in storage appears to be due to the practical incapacity, established experimentally, of these fungi to develop at the temperatures at which grapefruit is usually stored for shipment (53° F. or less). Besides these several other fungal rots were observed in the packing sheds. A full description is given of the character of the rots caused by the various organisms, as well as a tabulated account of inoculation experiments with them on Marsh grapefruit. *Trichoderma lignorum* [ibid., xiii, p. 775] has not been found causing primary rot of citrus fruits in Trinidad, and all inoculation attempts with it have given negative results.

TOMKINS (R. G.) & DREYER (D. J.). **Brown markings on S.A. Citrus fruits.**—*Citrus Grower*, 1935, 41, pp. 1-4, 33-35, 37-38, 40-42, 44, 46-48, 17 figs., 1935. [Afrikaans translation.]

Oranges and grapefruit from the Eastern Transvaal and East and West Cape are stated to have frequently arrived at the English markets during the 1934-5 season showing various types of brown markings and spotting. Low temperature breakdown, affecting fruit stored at or below 40° F. during the three weeks' voyage from South Africa, assumes the form of definite sunken areas, sometimes surrounded by a more faintly discoloured halo in which the browning is confined to the tissue between the oil cells, suggesting that the disturbance is partly due to the liberation of oil and subsequent damage to the tissues. Grapefruit from Portuguese East Africa, which is 33 days in transit, is

reported to have suffered from this type of injury for several seasons. It has been experimentally shown with 175 cases of Beira grapefruit that the disorder may be obviated by carrying the fruit at 52° F., but it is as yet uncertain to what extent this practice is commercially feasible. The Marsh Seedless variety appears to be the most susceptible to low temperature breakdown, Walters and Foster less so, and Triumph comparatively resistant.

Button browning or incipient stem-end rotting and corky lateral browning associated with *Colletotrichum gloeosporioides* and *Alternaria citri* [R.A.M., xiv, pp. 628, 692] were largely, though not exclusively, found in ethylene-treated fruit [cf. ibid., xiv, p. 578]. In the centre of the fairly soft, leathery spots characteristic of this type of damage, the oil cells had collapsed and the loss of water resulted in a smooth, somewhat silvery aspect. Oleocellosis [ibid., xiv, p. 356] is another common trouble among South African oranges, especially those that have been artificially ripened. Browning is confined to the tissue between the oil cells, the markings being irregular in size and outline but not modifying the contour of the fruit. On the other hand, in the case of injury due to low temperatures in the groves before picking, the brown areas are fairly regular, but the collapse of the cells causes pitting and thus induces a distinct change in the shape of the orange.

All these disturbances are thought to be interrelated and dependent on a number of factors necessitating local investigations before any definite scheme of control can be evolved. Some tentative suggestions, however, are made for improvements in current methods of handling the fruit.

**BECKLEY (V. A.). Observations on Coffee in Kenya. Pt. I. Chlorosis and die-back in Coffee.**—*Emp. J. exp. Agric.*, iii, 11, pp. 203-209, 2 pl., 1935.

In East Africa coffee plantations are sometimes so severely affected with chlorosis [R.A.M., x, p. 519] as to show up as yellow patches in the general landscape. Four types of the disease are discussed in this paper. The first is ascribed to nitrogen deficiency and is usually accompanied by die-back of the branches, while the roots are unaffected. The loss of crop is severe, but the disease is arrested by the application of nitrogenous manures. The second type, associated with a severe die-back of both branches and roots, is attributed to carbohydrate deficiency caused by overbearing. The two other forms recognized cannot yet be assigned to any definite causes.

**CLARA (F. M.). A new disease of Cotton (*Gossypium* sp.) in the Philippines.**—*Philipp. J. Agric.*, vi, 2, pp. 217-225, 3 pl., 1935.

Since 1932, cotton at the Central Experiment Station, Manila, has been affected by *Bacterium malvacearum* [cf. R.A.M., ii, p. 445], *Glomerella gossypii* [ibid., xiii, p. 804], and *Colletotrichum gossypii* [? *G. gossypii*: ibid., ix, p. 32], as well as by the following diseases not before observed in the Philippines, viz., *Helminthosporium* blight, *Cercospora althaeina* [ibid., xiv, p. 195], club leaf or cyrtosis [ibid., xi, p. 298], and an *Alternaria* leaf disease.

*Helminthosporium* blight [ibid., v, p. 423] produces circular to very

irregular, zonate, brown spots of various sizes on the leaves, chiefly the lower ones. Infected tissue may fall, producing a shot hole effect, and when severely attacked the leaf may be shed. The bracts and bolls are also involved, and badly infected plants are stunted. During the last two seasons the disease has caused considerable damage, though less in 1934 than in 1933. Infection was very probably introduced on cotton seed brought from abroad.

Inoculations of pot plants with pure cultures of the organism gave positive results on 13 out of 20 plants, the lesions being circular and brownish, but without concentric zonation. The mature, but not the youngest, leaves and bolls readily became infected.

A comparison of the morphological characters of the author's fungus with those of *H. gossypii* reported from Porto Rico [loc. cit.] showed differences in the size of the conidia and the conidiophores, the conidia of the Philippine organism measuring 77 to 164.65 by 12 to 16 (average 115 by 14.3)  $\mu$  and the conidiophores 81 to 162.8 by 5.5 to 7.4  $\mu$ . As, however, the Philippine fungus exhibits considerable variability and is closely similar to the Porto Rican in other characters the author refers it to *H. gossypii*.

Control consists in the selection, careful handling, and disinfection of the seed.

**MASSEY (R. E.). Section of Botany and Plant Pathology, G.A.R.S.**  
**Report by Mr. Massey on experimental work carried out by the**  
**staff of the section during season 1933-34.—Rep. Gezira Agric.**  
**Res. Serv., 1934, pp. 119-141, 1 diag., 1 graph, 1935. [Mimeo-**  
**graphed.]**

In 1934, the cotton wilt found every year for the last ten years towards the end of October in the Gezira area of the Sudan [R.A.M., xiv, p. 358] was observed on about 9th November. During December it became prevalent all over the Gezira Research Farm, the mortality averaging about 2.5 per cent., but in the worst spots reaching up to 15.3 per cent. Heavy shedding of leaves, buds, and bolls was general throughout the Gezira in November and December, the estimated yield of the crop being halved in two months owing to the loss of unripe bolls, many of which showed no sign of disease. In general, the greatest losses occurred between mid-November and mid-December. The root systems of plants dead or wilting were severely affected and marked destruction of the fine rootlets was usual even in plants not actually wilting. The finest rootlets showed heavy fungal invasion, the most striking feature being the presence in Sakel rootlets of the vesicles of the Phycomycetoid endophytic fungus [ibid., xiv, p. 248]. Other fungi isolated included *Fusarium solani* [ibid., xiii, p. 696], *F. scirpi* var. *caudatum* [ibid., xiii, pp. 128, 593] (a parasite of *Hibiscus esculentus*), *Gibberella moniliformis*, a species probably belonging to section *Elegans* or *Martiella*, a fungus apparently agreeing with *F. falcatum*, *Macrophomina phaseoli* (possibly two strains), and a pycnidial fungus resembling *Ascochyta gossypii*. From the beginning of the investigation in December *Pythium* species were obtained from the blackened stumps of affected rootlets. It was also found that unsterilized extracts of Gezira soils taken from the surface or from a depth of over two feet

produced on cotton seedlings grown therein suppression of root development, browning, and a slimy rot. The disease was also associated with soils having a high alkali content. The evidence as a whole strongly indicates that a group of fungi exert a seasonal attack on the root system, beginning probably at the end of September and extending throughout October and early November. In years of heavy rainfall this preliminary attack, probably due to *Pythium*, is followed by root invasion by other fungi.

For the first time in the Gezira the leaf curl damage from ratoon cotton was largely eliminated by pulling up the crop at the end of the season [ibid., xiii, p. 697]. Although diseased plants could be found in the new crop from 4th October onwards, the disease did not become really noticeable in any part of the Gezira until very late in the season.

Blackarm [*Bacterium malvacearum*: ibid., xiii, p. 765; xiv, p. 358] was present everywhere on the Gezira Research Farm by the end of November, but was really serious only where heavy initial infection had been present. Confirmation was obtained of the view previously expressed [ibid., xiii, p. 696] that the main source of infection of the new crop is adjacent land on which cotton has been grown the season before. A further test on the effect of flooding on destroying *Bact. malvacearum* in plant remains [loc. cit.] showed that plots sown after being spread with infected débris and then flooded for 4 and 2 days averaged, respectively, 2.1 and 2.8 per cent. blackarm, as against 69.5 per cent. for the controls not subjected to flooding. The leaves in the flooded series were only slightly spotted, whereas in the controls the lesions were larger, often running down the veins.

An active bacteriophage [ibid., xiii, p. 697] was again isolated from Blue Nile flood water (September), but all attempts to detect it in Blue or Main Nile water during winter (January onwards) failed. It was found in every sample examined of Gezira soil taken from plots that had recently borne infected cotton and its formation was induced in garden soil by repeated inoculations with a non-lytic culture of *Bact. malvacearum*.

**LAVIER (G.).** *Sur une Nucleophaga parasite d'Entamoeba ranarum.*—  
[On a species of *Nucleophaga* parasitizing *Entamoeba ranarum*.]—  
*Ann. Parasit. hum. comp.*, xiii, 4, pp. 351-361, 1 pl., 1 fig., 1935.

An account is given of an apparently undescribed Chytridiaceous parasite of the nucleus of *Entamoeba ranarum* occurring in *Alytes obstetricans* tadpoles from the Côte-d'Or, France, which is named *Nucleophaga ranarum* [without a Latin diagnosis]. After having gained entrance into the host nucleus, the parasite at first appears as a small, greyish, finely granulated body which later divides into a central mass and a ring of peripheral chromatic masses, presumably representing nuclei of the organism; these masses progressively increase in number until the greatly hypertrophied nucleus of the host is filled with them; at this stage the masses are transformed into spores, elliptical rather than spherical in shape and about  $2\mu$  in their longest diameter. No sporangial envelope has so far been seen, and the spores appear to be dispersed with the rupture of the host nucleus.

COUCH (J. N.). **A new saprophytic species of *Lagenidium*, with notes on other forms.**—*Mycologia*, xxvii, 4, pp. 376-387, 40 figs., 1935.

A detailed description [but no Latin diagnosis] is given of a new species of *Lagenidium*, named by the author *L. giganteum*, which was found in North Carolina weakly parasitic on mosquito larvae, and in Virginia on *Daphne* and copepods. Inside the host insect the fungus forms hyphal segments measuring 50 to 300 by 6 to 40  $\mu$ , any one of which may develop into a sporangium. Numerous slender external hyphae extend from the host to a distance of 1 or 2 mm. to form a fringe which has much the appearance of a delicate species of *Aphanomyces*; most of these hyphae are long emergence tubes for the sporangia, the contents of which are emptied as an undifferentiated, naked mass (sometimes several masses). Eventually this mass differentiates into a variable number of monoplanetic, kidney-shaped, laterally biciliate zoospores, 8 to 9 by 9 to 10  $\mu$  in diameter. The fungus was cultured on a variety of media, on some of which it formed an extensive mycelium.

Notes are also given on five other species (one doubtful) of this genus.

REDAELLI (P.) & CIFERRI (R.). **A propos de nouveaux synonymes probables de *Torulopsis neoformans* (Sanf.) Red. 1931.** [Concerning some new probable synonyms of *Torulopsis neoformans* (Sanf.) Red. 1931.]—*Boll. Sez. ital. Soc. int. Microbiol.*, vii, 7, pp. 243-244, 1935.

After referring to Giordano's recent studies on *Torulopsis neoformans* [R.A.M., xiv, p. 694] the authors state that in all probability *Cryptococcus guilliermondi*, *C. kleini*, *C. plimmeri*, and *C. breweri* are also identical with this species, though in the absence of authentic material their opinion is based only on the published descriptions of these organisms. All show more or less viscous, shining colonies, spherical or spheroidal cells surrounded by a mucous capsule, an inability to ferment carbohydrates, and a ready adaptability to different media.

GOMEZ-VEGA (PAULINA). **Mycostatic studies on certain *Moniliae* and related fungi.**—*Arch. Derm. Syph.*, Chicago, xxxii, 1, pp. 49-58, 1935.

Crystal violet and its compounds, gentian and methyl violet [R.A.M., xiv, p. 584], showed marked specific action or selective activity *in vitro* on *Monilia* and *Torula* spp. isolated from human patients at Bogota, Colombia, inhibiting growth at concentrations of 1 in 1,000,000. The first-named has further given promising results in the clinical treatment of monilial paronychia [ibid., xi, p. 714] and of onychia associated with (?) *Trichophyton*. Mercurochrome showed no fungistatic [growth-inhibiting] action in dilutions of 1 in 500, but proved to be a powerful sensitizer to visible light, inhibiting the growth of *M.*, *T.*, *Epidermophyton*, and *Saccharomyces* spp. at 1 in 10,000 after a brief exposure to sunlight. A strong fungicidal action was exerted by cresol, which destroyed the above-mentioned organisms in half a minute at 1 in 250.

WOODWARD (J. G.), KINGERY (L. B.), & WILLIAMS (R. J.). The fungicidal power of phenol derivatives. II. Strength in the presence of proteins.—*J. Lab. clin. Med.*, xx, 9, pp. 950-953 1935.

Three phenol derivatives, viz., n-hexylresorcinol, chlorothymol, and thymol, were compared with iodine, sodium hypochlorite and thiosulphate, salicylic and benzoic acids for their toxicity to *Monilia* [*Candida*] *tropicalis* in the presence of proteins, represented by hide dust, vesicle fluid, and blood serum [*R.A.M.*, xiv, p. 584].

The strong fungicidal action of iodine was greatly reduced in the protein suspensions, the effect of which on n-hexylresorcinol was similar but relatively less powerful; saturated solutions of chlorothymol, benzoic and salicylic acids, and sodium thiosulphate were entirely inactive in the presence of proteins and thymol was toxic only in the hide dust suspension, whereas sodium hypochlorite maintained its killing capacity at high concentrations (1 in 750 in hide dust and 1 in 500 in the two other proteins used).

Preliminary results with some of the higher phenol derivatives suggest possibilities of an extended application for fungicidal purposes.

MERCER (S. T.) & FARBER (G. J.). An epidemic of ringworm due to *Epidermophyton floccosum* (inguinale).—*Arch. Derm. Syph.*, Chicago, xxvii, 1, pp. 62-68, 1935.

Details are given of an epidemic of crural ringworm (*Epidermophyton floccosum*) [*R.A.M.*, xiv, p. 510] involving 52 members of the crew of a New York passenger liner. Infection was of exceptional virulence, causing generalized lesions in five men and more or less extensive eruptions in others. On Sabouraud's maltose agar the colonies of the fungus consisted of a flattened cone with an irregularly cupped, eccentric apex and radial folds extending to the fringed borders and a powdery, greenish-yellow surface. Numerous oval or clavate, septate macroconidia (fuseaux) developed singly or in clusters, accompanied in some cultures by chlamydospores.

MAGALHÃES (O. DE). Ensaicos de mycologia. [Mycological studies.]—*Mem. Inst. Osw. Cruz*, xxx, 1, pp. 1-55, 48 pl. (3 col.), 1935.

A full account is given of the author's studies on the 13 fungi associated with 60 cases of human diseases in Minas Geraes, Brazil. Five fresh cases of *Coccidioides immitis* [*R.A.M.*, xiv, p. 631] were investigated. A 21-year-old female patient suffered from facial lesions due to *Rhinocladium* [*Sporotrichum*] *beurmanni* [ibid., xiv, p. 632]. Kaufmann-Wolf's *Trichophyton* [*Epidermophyton*] and four forms differentiated by Ota are regarded as variants of *T. interdigitale* [*T. mentagrophytes*: ibid., xiv, p. 101 *et passim*], while Kambayashi's *Microsporon japonicum* [ibid., xii, p. 290] would appear to be identical with Ota's *M. ferrugineum* [ibid., xiii, p. 768]. A table is given (pp. 8-35) showing the date of publication, author, citation of the original description, and in some cases synonymy, of 175 ringworm fungi. In conclusion descriptions and extensive observations are given on the morphological, cultural, and pathogenic characters of two new species [figures of which are also included but no Latin diagnoses], viz., *T. gameliiae* isolated

from Dutch cattle, and *M. (Sabouraudites) paraferrugineum* from a female infant.

SHAW (R. M.) & MACGREGOR (J. W.). **Maduromycosis: with the report of a case due to *Monosporium apiospermum*.**—*Canad. med. Ass. J.*, xxxiii, 1, pp. 23-28, 3 figs., 1935.

Following an introductory summary of the history and etiology of maduromycosis a full clinical description is given of a case of this disease, believed to be the first in Canada, in a 42-year-old farmer. The fungus isolated from the left leg was identified as *Monosporium [Scedosporium] apiospermum* [R.A.M., xiv, p. 637 and next abstract]. Cultural and morphological details of the organism are given.

DOWDING (ELEANOR S.). ***Monosporium apiospermum*, a fungus causing Madura foot in Canada.**—*Canad. med. Ass. J.*, xxxiii, 1, pp. 28-32, 9 figs., 1935.

*Monosporium [Scedosporium] apiospermum*, isolated from a case of maduromycosis in Canada [see preceding abstract], was grown on glucose agar and on Sabouraud's medium with European cultures of the same fungus for comparison. In addition to features previously described [which are summarized], the following observations were made. The cultures darken from white to cinnamon-drab. Unlike the United States strains, the experimental material produced no sclerotia but frequently exhibited a growth of short, dark brown aerial hyphae. The mycelium is characterized by terminal and intercalary swellings and 'racquet hyphae'. The sterigmata sometimes occur on the conidiophores in whorls of two to five. Normally the spores are borne singly, but they may collect in groups when several in succession are produced by a sterigma.

A fungus of the *Scedosporium* type, isolated from a potato tuber, is stated to have been identified by G. R. Bisby as a species of *Geomycetes*.

REDAELLI (P.) & CIFERRI (R.). **Una possibile nuova specie del genere *Histoplasma*: *H. pyriformis* (Moore) Cif. et Red.** [A possible new species of the genus *Histoplasma*: *H. pyriformis* (Moore) Cif. & Red.]—*Boll. Soc. ital. Biol. sper.*, x, 7, pp. 567-570, 1935.

According to a private communication from F. D. Weidman, of the University of Philadelphia, Moore's reputed new species of *Posadasia*, *P. pyriformis* [R.A.M., xiv, p. 582], was isolated from the case described by Hansmann and Schenken as due to an undetermined species of *Sepedonium* [ibid., xiv, p. 235]. Attention is drawn to the very close resemblances between the organism in question and the type species of *Histoplasma*, *H. capsulatum* [ibid., xiv, p. 631], and in the writers' opinion the former should in fact be transferred to *Histoplasma* as *H. pyriformis* (Moore) Cif. et Red. n.comb. with *P. pyriformis* Moore and *S. sp.* Hansmann and Schenken as synonyms.

[An expanded version of this paper is given by Ciferri (R.) and Redaelli (P.) in 'Une quatrième espèce du genre *Histoplasma*'.—*Boll. Sez. ital. Soc. int. Microbiol.*, vii, 7, pp. 245-252, 1935.]

VAN BEYMA THOE KINGMA (F. M.). Ueber *Cephalosporium serraе* Maffei und *Cephalosporium stühmeri* Schmidt et van Beyma, zwei gute Arten der Gattung *Cephalosporium*. [On *Cephalosporium serraе* Maffei and *Cephalosporium stühmeri* Schmidt & van Beyma, two good species of the genus *Cephalosporium*.]—*Zbl. Bakt.*, Abt. 1 (Orig.), cxxxiv, 3-4, pp. 187-188, 1935.

The suggestion having been made by M. Focosi [*R.A.M.*, xiv, p. 36] that *Cephalosporium stühmeri* Schmidt & van Beyma is identical with *C. serraе* Maffei, the writer gives comparative morphological and cultural particulars clearly showing the differences between the two species. These include completely divergent types of colony growth and conidial dimensions besides the formation by *C. serraе* of brown chlamydospores which are absent in *C. stühmeri*.

VERNON (T. R.). Studies on the mycological problems of dairying. I. The surface moulding of butter. II. The internal and subsurface discolorations of butter.—*J. Dairy Res.*, vi, 2, pp. 154-174, 1 pl., 6 graphs, 1935.

The following fungi were obtained in over 2,000 isolations from definite superficial discolorations on samples of the butter consignments arriving at the Port of London from various countries, chiefly New Zealand, Australia, Denmark, Central Europe, Russia, South Africa, and the Argentine: five strains of *Cladosporium herbarum*, nine forms of *Penicillium*, three representatives of the *Aspergillus glaucus* group, *Alternaria* sp., *Stemphylium* sp., *Fusarium* spp. (including *F. culmorum*), and eight forms of *Phoma* [*R.A.M.*, xiii, p. 443; xiv, pp. 237, 633]. The first five of these were further isolated repeatedly from spots on wood and parchment, the former also occasionally bearing small patches of *Phoma* pycnidia. *P. alternariaceum*, only once isolated from butter, was three times cultured from discoloured wood, the greenish spots on which were also found to be associated with contamination by *Trichoderma lignorum*. Other occasional agents of superficial infection on butter included *Mucor*, *Verticillium*, *Gliocladium*, *Stysanus*, and *Acrostalagmus* spp., *Oospora lactis*, and *Trichothecium roseum*.

*C. herbarum* was consistently isolated from bluish-black spots of variable size and shape, *Phoma* and occasionally *Alternaria* from a large, spreading, muddy-brown blemish, *Penicillium* or members of the *Aspergillus glaucus* group from green surface growths, *Stemphylium* sp. from small, black spots, and *F. culmorum* from an extensive bright reddish-pink area in New Zealand and Australian samples. A hitherto unidentified organism with a brownish mycelium, exuding a vivid yellowish-brown pigment into the medium, was isolated from a fairly common orange-yellow discoloration of considerable extent. The fungi were experimentally shown to be capable of reproducing the conditions with which they were associated.

Fungal infection of butter is promoted by humid conditions and high temperatures. Butter inoculated with spores of the above-mentioned fungi was stored at 15° to 18° F. for varying periods from three months to over two years without developing any trace of discoloration, a result that may be generally verified in ordinary commercial practice.

From the blue-black subsurface and internal discolorations of unsalted or lightly salted samples six strains of *C. herbarum* were isolated and used in inoculation experiments with positive results. The colour and extent of mycelial growth varied considerably, being very sparse and intensely dark olive-green in a heavily sporing strain, cream-coloured and luxuriant in two others producing scanty spores. Four of the strains survived  $3\frac{1}{2}$  months' exposure to a temperature of  $20^{\circ}$  to  $24^{\circ}$ , but none withstood the normal cold store temperature of  $15^{\circ}$  to  $18^{\circ}$ .

NEILL (J. C.). **Prevention of mould-growth on box-timber.**—*N.Z. J. Agric.*, li, 1, pp. 22-26, 2 figs., 1935.

The results of the experiments briefly reported in this paper showed that dipping white pine (*Podocarpus dauricus*) boards, destined for making butter-boxes, in a 0.1 per cent. solution of shirlan WS [*R.A.M.*, xiii, p. 791] for ten minutes at about  $56^{\circ}$  F., rendered the boxes extremely resistant to the development on them of the more common box mould fungi with which the wood was inoculated, namely, *Cladosporium herbarum*, *Alternaria* sp., *Penicillium expansum*, *P. puberulum* [cf. *ibid.*, xiii, p. 514 and preceding abstract] and *Pullularia pullulans* [*ibid.*, ix, p. 77; xii, p. 605]. It is pointed out, however, that complete immunity from the establishment of the moulds on the treated wood could not be obtained even by steeping the wood up to 60 minutes in a 1 per cent. solution of shirlan WS.

STUART (L. S.). **The production of lipolytic and depilating enzymes by the *Aspergillus flavus-oryzae* group.**—*J. Amer. Leath. Chem. Ass.*, xxx, 6, pp. 315-321, 1935.

Nine of 36 strains of the *Aspergillus flavus-oryzae* group (supplied by C. Thom) yielded enzymes capable of completely loosening the hair from salt-cured, soaked calfskin [cf. *R.A.M.*, vii, p. 385], while a further six exercised a similar but slighter effect. No correlation was detected between the lipolytic and depilatory properties of the various strains, all of which showed a certain capacity, varying widely in individual cases, for lipase production [*ibid.*, xi, p. 636; xii, p. 47]. Calculated on a dry weight basis, however, the most actively lipolytic strain produced only 0.0005 Willstätter lipase units per mg. as compared with 0.0027 for the same amount of pancreatic tissue.

ARMAND (L.). **Le mildiou de la laine.** [Wool mildew.]—*Rev. gén. Teint.*, xii, 9, pp. 675, 677, 679; 10, pp. 751, 753, 755; 11, pp. 831, 833, 835; 12, pp. 917, 919, 921, 923, 1934; xiii, 1, pp. 23, 25, 27, 1935.

A detailed account is given of the writer's two years' researches in French factories on the effect of dyes on the development of mildew in wool [*R.A.M.*, xiv, p. 585]. None of the substances tested was found to possess antiseptic properties, or at any rate not in a sufficient degree to render it commercially interesting. Only when the dye molecule contained a large number of certain electro-negative groups, especially the halogens (iodine, bromine, and chlorine), the nitrate groups, and the carboxyl radicals, was there any indication of a retardatory action on

the moulds concerned, the decisive factor in the growth of which is the presence in the wool of the degradation products arising from the albuminoid substances composing the fibres. These may best be eliminated by chromatation, while a certain protective value is also conferred by the admixture of copper sulphate, chromium fluoride, or formol with the dyes. On the other hand, mildew is favoured by all treatments tending to break down the keratin molecule in the wool, and more especially by the alkaline processes used in vat-dyeing.

**BABEL (A.). Neuere Versuche zur Lein-Beizung.** [Recent experiments in Flax disinfection.]—*Nachr. SchädlBekämpf., Leverkusen*, x, 2, pp. 70-73, 1935. [English and French summaries on pp. 101-102 and 104.]

Recent investigations at the Fibre Research Institute, Sorau, Niederlausitz [Saxony] are stated to have shown that the most important seed-borne diseases of flax are wilt (*Fusarium lini*) [*R.A.M.*, xiv, p. 634] and anthracnose (*Colletotrichum lini*) [*ibid.*, xiii, p. 390], the latter apparently sparing none of the known varieties and occurring to the extent of 2 to 20 per cent. and upwards in the seed from all sources examined. Promising results in the control of these fungi have been obtained by dusting the seed with ceresan [*ibid.*, x, p. 597; xi, p. 182], which reduced the number of diseased plants from 493 out of a total of 600 to 44 out of 500, besides increasing germination by up to 13 per cent.

**SMITH (K. M.). Some diseases of ornamental plants caused by the virus of Tomato spotted wilt.**—*J. R. hort. Soc.*, lx, 7, pp. 304-310, 5 pl., 1935.

The author calls attention to the damage done to ornamental plants by the tomato spotted wilt virus [*R.A.M.*, xiv, p. 725] and to its further potentialities for harm, owing to the very wide range of host plants susceptible to it, and gives an annotated list, admittedly incomplete, of diseases caused by the virus in ornamental plants. Besides a number of species already noticed from time to time in this *Review*, the symptoms caused by it are also described on *Salpiglossis* sp., stocks (*Matthiola* sp.), cauliflowers, *Zinnia* sp., chrysanthemums, and *Calendula*. On the Solanaceous hosts (apart from tomato) the most common symptom is the development of ring- or wave-like markings; on *Matthiola* the disease is severe and is characterized by crinkling and yellowing of the leaves; while other important hosts are chrysanthemum (which becomes stunted, the young leaves twisted and pallid, with some mottling and brown spotting of leaves and stems) and calceolaria (characterized by large, pale, irregular blotches on the leaves). Possible measures of control are briefly discussed, based on the destruction of the vector, *Thrips tabaci*, the removal of diseased plants, and the segregation of tomatoes from susceptible ornamentals.

**MASSEY (L. M.) & JENKINS (ANNA E.). Scab of Violet caused by Sphaceloma.**—*Mem. Cornell agric. Exp. Sta.* 176, 9 pp., 4 pl. (1 col.), 1935.

The results of further studies of the disease of cultivated violets

(*Viola odorata*) briefly described from the United States in a previous communication [R.A.M., xii, p. 449] showed that the trouble is distributed and highly destructive in several of the eastern and south-eastern States, and that it has also been recorded in 1934 by T. H. Harrison in a garden at Richmond, New South Wales. The disease is known to affect the Mrs. David Lloyd George, Freys Fragrant, Princess Mary, Double Russian, Governor Herrick, Rosina, and Princess of Wales horticultural varieties, the three first named being highly susceptible; it has also been found occurring naturally on several North American wild species of the violet, and in one locality in New Jersey on pansies (*V. tricolor*).

In addition to the symptoms already described [loc. cit.], the disease may cause circular to irregular lesions, usually not over 1.5 mm. in diameter, on the inflorescence, capsules, and sepals.

Morphological and cultural studies of the causal fungus indicated that it is an apparently hitherto undescribed species of *Sphaeloma*, which is named *S. violae* Jenkins, English and Latin diagnoses being appended. The acervuli are pulvinate (often about 18 mm. in diameter) or effuse; the conidiophores are at first hyaline, slightly coloured later, pointed or obtuse, 0- to 1-septate, and 9 to 12 by 2 to 4  $\mu$ ; the conidia are 0- to 2-septate, usually hyaline, and 2 to 5 by 3 to 15  $\mu$ ; and the microconidia are minute, spherical, often agglomerated on the surface of the lesion. In pure culture the optimum temperature for growth and sporulation was found to be from 21° to 26° C.

The best field control of the disease so far obtained was by spraying with 4:4:50 Bordeaux mixture at intervals of ten days to two weeks.

TASUGI (H.) & IKENO (S.). **On the intracellular bodies associated with the mosaic disease of the Lily. (Preliminary report.)**—*Ann. phytopath. Soc. Japan*, v, 1, pp. 30-43, 7 figs., 1935. [Japanese, with English summary.]

In mosaic leaves of *Lilium speciosum* f. *rubrum* [R.A.M., xiv, p. 634] the living cells showed the presence of vacuolate, round to ellipsoid, intracellular bodies which measured 8.9 to 68.6 by 6.9 to 34.3  $\mu$  and were in many cases larger than the host nuclei. In seriously affected plants they were abundantly present in the epidermal cells of the leaves, but in the early stages of the disease they were absent or sparsely distributed, in close contact with the host nuclei, round, without vacuoles, and resembled aggregates of particles. They withstood treatment with 15 per cent. sulphuric acid for 5 minutes, but though insoluble in alcohol, ether, or chloroform they dissolved rapidly in N/5 caustic soda solution. The  $P_n$  value of these bodies and the host nuclei lay between 4.0 and 4.8, approximately.

PASINETTI (L.) & BUZZATI-TRAVERSO (A.). **Su alcune forme di cancrena delle Cactacee dovute a nuovi micromiceti e ad un batterio. [On certain forms of gangrene in Cactaceae caused by new micro-mycetes and by a bacterium.]**—*Nuovo G. bot. ital.*, N.S., xlii, 1, pp. 89-123, 4 pl., 1935.

A morphological and cultural account [with Latin diagnoses] is given of five fungal and one bacterial species, which were isolated from

rotting tissues of certain cultivated Cactaceae in the Italian Riviera and are considered to be new to science, namely: *Fusarium cactacearum* from a basal dry rot of *Thelocactus nidulans*, and *F. cacti maxonii* from a similar rot of *Cactus maxonii*; *Sporotrichum cactorum* and *S. traversianum* from soft, black medullary rots of *Cereus peruvianus* and *Neomamillaria gülzowiana*, respectively; both kinds of rot progressed from the top to the base of the affected plants; *Monosporium cactacearum* from a wet, light brown medullary rot of *Coryphantha [Mamillaria] valida*; and *Bacterium caktivorum* from a wet, black rot progressing from the base to the top of *Cephalocereus [Cereus] senilis*. Inoculation experiments showed that both species of *Sporotrichum* and *M. cactacearum* are aggressive parasites, capable of penetrating through the uninjured cuticle of the host, while the two *Fusarium* and the *Bacterium* species are only wound parasites.

VERONA (O.) & CECCARELLI (A.). *Su di una tracheomicosi dell'Amaranto (Amaranthus tricolor L.) prodotto da una specie di Fusarium e da Verticillium amaranti n.sp. e, in genere, sulla biologia di alcuni Verticillium patogeni.* [On a tracheomycosis of the Amaranth (*Amaranthus tricolor L.*) produced by a species of *Fusarium* and by *Verticillium amaranti* n.sp., and on the biology of some pathogenic species of *Verticillium* in general.]—*Phytopath. Z.*, viii, 4, pp. 373-400, 8 figs., 5 graphs, 1935.

A comprehensive, tabulated account, followed by a bibliography of 60 titles, is given of the writers' studies on a typical tracheomycosis of *Amaranthus tricolor* at Bagni di Casciana, some 30 km. from Pisa, associated with an undetermined *Fusarium* of the *vasinfectum* group and a new species of *Verticillium*, *V. amaranti* [a Latin diagnosis of which is given]. The latter forms on bean-saccharose agar colonies, which are white at first, turning brownish-black, and assuming a crustaceous consistency. The bi- to tri-, rarely non-verticillate conidiophores measure 150 to 180 by 2 to 3  $\mu$ , the verticils consisting of three to four branchlets, 24 to 32  $\mu$  long, at the apices of which are borne heads of ellipsoid conidia, 4.8 to 6.4 by 3 to 3.2  $\mu$ ; the catenulate or conglobate, olivaceous to black chlamydospores, 9.6 by 6.4  $\mu$ , form pseudosclerotia. In inoculation experiments with the *Fusarium* and *V. amaranti* on *A. tricolor* and *Sempervivum tectorum*, each fungus gave positive results on each host.

Nitrites were produced on a medium in which potassium nitrate was the source of nitrogen by *V. amaranti*, *V. albo-atrum*, *V. dahliae*, and *V. tracheiphilum* [R.A.M., x, p. 758], and the first named further elaborated a thermostable substance inhibitory to the germination of wheat, lucerne, clover, and *Amaranthus* seeds placed in filtrates of the cultures. The optimum hydrogen-ion concentration for *V. albo-atrum* was found to be  $P_H$  8.5, for *V. dahliae* 4.9, for *V. tracheiphilum* 5.6, and for *V. amaranti* 5.0. All four species made the best growth at 24° to 26° C., readily assimilated peptone, and utilized glucose as a source of carbon, while their growth was inhibited by malachite green and brilliant green [ibid., xiv, p. 583] at concentrations between 1 in 200,000 and 1 in 500,000.

RIKER (A. J.), JONES (F. R.), & DAVIS (MARGUERITE C.). **Bacterial leaf spot of Alfalfa.**—*J. agric. Res.*, li, 2, pp. 177-182, 1 fig., 1935.

A brief account is given of a bacterial leaf spot of lucerne, which was first noticed in 1930 in experimental rows in two places at Madison, Wisconsin; it again occurred in the same places in 1931, but it was never found in lucerne fields. The first symptom of the disease is the appearance on the leaves of very small, water-soaked spots which may coalesce as they increase in size, especially along the midrib and at the ends of the leaflets, forming areas of dead tissue which soon dries. In spots attaining 2 to 3 mm. in diameter the centre is often yellow with a dark brown border surrounded by a straw-coloured halo. Stem lesions were not observed in nature, but developed in artificially inoculated plants. In later stages the spot is strongly reminiscent of certain spots caused by fungi, to which the disease may have been attributed many times in the past.

Isolations from diseased tissues yielded an apparently undescribed bacterium, which is named *Phytomonas alfalfa* (or *Pseudomonas alfalfa* and *Bacterium alfalfa* according to other systems of classification). It is an aerobic, motile, Gram-negative, non acid-fast, apparently non-sporulating and non capsule-forming rod, ranging from 0.93 to 4.56 by 0.28 to 0.77  $\mu$  (average 2.14 by 0.45  $\mu$ ) in diameter. On nutrient agar it forms circular, convex, smooth, white to pale yellow colonies with smooth margins. It liquefies gelatine and hydrolyses starch, forms ammonia slowly in a nitrate medium, and clears litmus milk with digestion of casein. Its temperature relations are: minimum 4°, maximum about 36°, and optimum between 24° and 32° C.

FLACHS (K.). **Einige weniger bekannte Gräserkrankheiten.** [Some lesser known grass diseases.]—*Nachr. SchädlBekämpf., Leverkusen*, x, 2, pp. 57-62, 4 figs., 1935. [English and French summaries on pp. 101, 103.]

Semi-popular notes are given on the grass diseases caused in Germany by *Aphonobacter* [*Bacterium*] *rathayi* [R.A.M., xiv, p. 514], attacking chiefly *Dactylis glomerata* but occasionally found on rye and *Cynodon dactylon*; *Sclerotium rhizodes*, believed to be the agent of the so-called 'string of pearls' disease on a large number of species; *Epichloe typhina* [ibid., xiii, p. 706] on *Phleum* [*pratense*], *D.* [*glomerata*], *Agrostis vulgaris*, and other hosts; and the Myxomycete, *Spumaria alba* [*Mucilago spongiosa*: ibid., vi, p. 765], which during protracted wet periods forms on grasses and other plants. The distribution of the diseases in other European countries is indicated.

BALLARD (W. S.) & LINDNER (R. C.). **Studies of the little-leaf disease in California.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 1-10, 1935.

An account is given of observations (dating from 1924 in the case of the senior author) on the environmental relations and treatment of little leaf of fruit trees and vines in California [R.A.M., xiv, p. 642 and next abstract].

In the spring of 1925 a block of eight-year-old Malaga grapes growing in a 'corral spot' (a plot of ground formerly occupied by livestock),

found to be severely affected by the disorder, were cut off and regrafted with scions from healthy vines. This treatment proving ineffectual, 35 of the diseased vines were transferred to a fresh locality in 1927, whereupon prompt recovery took place. In the writers' opinion the so-called 'corral spot sickness' is identical with little leaf. In 1934 the following percentages of disease were recorded on various fruits planted in a corral spot in 1931: Kelsey Japan plum 100, seedling pecan [*Carya pecan*] 100, Muir peach 92, Yellow Egg plum 75, Early Harvest apple 50, Payne's seedling walnut 25, and Malaga grape 23. These figures afford a general idea of the susceptibility of the experimental fruits and nuts to little leaf, besides showing the rapid and extensive progress of the disturbance in 'corral spot' plantings.

In an experiment carried out in 1934 cuttings from badly diseased Alicante Bouschet vines were planted in coarse sand and supplied with a certain amount of zinc from the galvanized pipe-line used in watering, with the result that the later foliage was free from little leaf.

In 1932 zinc sulphate and other materials were applied to the soil surrounding vines both in solutions and as dry salts with conflicting results. In 1933 early spring treatment of vines in sandy loam soil with 10 lb. zinc sulphate proved effective by the following June, while Becky Smith plums and old vines treated about the same time with up to 15 lb. zinc sulphate showed a marked improvement in 1934. Kelsey plums on heavy orchard soil were severely damaged by soil treatments with zinc sulphate (10, 15, or 20 lb.) applied on 30th March, 1934, indicating that this method of control should be confined to the dormant season. Striking results have been obtained by the injection of zinc sulphate into vines through holes bored in the trunk, but this method is slow, costly, of doubtful permanence, and liable to promote wood rots. In 1934 the condition of little leaf vines was greatly improved by spraying with a mixture of 10 lb. of zinc oxide or zinc sulphide plus 6 oz. zinc sulphate and an appropriate quantity of casein spreader in 50 gallons. water, the object of this combination being to reduce the burning injury apt to accompany zinc sulphate alone without sacrificing the rapid efficacy of the compound. The best results on pecans were given by a zinc-ammonia solution, which was in fact generally promising apart from a tendency to damage the leaves under humid conditions.

The results of these investigations are thought to indicate that little leaf, rosette, and allied disturbances are caused by zinc deficiency, but whether the action of the zinc applied in the various treatments is direct or indirect must remain uncertain pending the growth of the susceptible plants in a zinc-free medium.

CHANDLER (W. H.), HOAGLAND (D. R.), & HIBBARD (P. L.). **Little-leaf or rosette of fruit trees, IV.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 11-19, 3 figs., 1935.

In nearly all Californian soils the fixing power for zinc has been found to be so high that soil treatments against little leaf with zinc compounds [*R.A.M.*, xiv, p. 176 and preceding abstract] are unduly expensive and their results uncertain, since a high fixing power not only necessitates a heavy increase in the amount of zinc required for curative purposes but also curtails the duration of its beneficial action. These disadvan-

tages may be counteracted by the admixture with the zinc sulphate of large quantities of ferrous sulphate. Treatment with 35 to 100 lb. impure ferrous sulphate containing zinc equivalent to 2 to 6 lb. zinc sulphate kept trees free from little leaf more than twice as long as the application of 5 to 25 lb. zinc sulphate alone.

The spraying of apricot, peach, and plum trees in the spring and early summer with a mixture of 10 lb. zinc sulphate and 5 lb. lime in 100 gallons water gave very satisfactory results, especially in the case of the first-named, whereas walnuts failed to respond and vines only benefited temporarily. In none of these trees were the effects of the treatment as pronounced as in citrus. Where the little leaf symptoms are restricted to the spring growth and do not involve late summer mottling zinc sulphate (10 to 32 lb. in 100 gallons with or without lime) may be applied to mature foliage in the autumn with satisfactory results. Peach, apricot, plum, and apple trees all put out healthy leaves in the spring following this treatment. Applications of zinc sulphate at high concentrations during the dormant season preserved even the most severely affected trees from little leaf until midsummer or later.

Good control of severe little leaf in vines was secured by brushing with a solution of 2 lb. zinc sulphate in 1 gallon water immediately after pruning, the wounds made by which apparently facilitate absorption of the zinc; in trees this treatment was less efficacious. Vines, apples, stone fruit, and walnuts reacted favourably to the insertion of zinc-coated nails or No. 2 diamond-shaped glazier's points. The response of citrus trees to the latter treatment was very slow when made at all, but favourable results were obtained with *Juglans hindsii*, fig, pecan [*Carya pecan*], Carolina poplar [*Populus canadensis*], *Melia* [*azedarach*], and *Ligustrum* [? *ovalifolium*]. The insertion of No. 0 glazier's points  $\frac{1}{2}$  in. apart injured the bark of walnut trees, while peaches suffered severely from similar treatment ( $\frac{1}{8}$  to  $\frac{1}{2}$  in.) with zinc pieces or zinc-coated nails. The other fruit trees used in the tests were not adversely affected, and by widening the spaces between the points to 1 in. damage even to the sensitive peaches and walnuts was obviated. Further experiments are necessary to determine the risks of injury from this method of treatment and the duration of its therapeutic action.

**CROSBY (C. R.), MILLS (W. D.), & BLAUVELT (W. E.). Protecting orchard crops from diseases and insects in western New York.—*Ext. Bull. Cornell agric. Exp. Sta.* 313, 92 pp., 18 figs., 1935.**

This bulletin represents an attempt to supply fruit growers of western New York with information concerning the latest developments in the practical control of fungal diseases and insect pests of the apple, pear, cherry, peach, plum, and quince. Spray calendars for each host are given and each of the diseases and pests is dealt with separately in popular terms. In a concluding section notes are given concerning the spray materials used.

**CROSBY (C. R.) & MILLS (W. D.). Protecting orchard crops from diseases and insects in the Hudson Valley.—*Ext. Bull. Cornell agric. Exp. Sta.* 314, 89 pp., 16 figs., 1935.**

This is a slightly modified version (omitting quince diseases) of the

Extension Bulletin 313 [see preceding abstract], calculated to apply to conditions obtaining in the Hudson Valley, New York State.

GOODWIN (W.), PIZER (N. H.), SALMON (E. S.), & WARE (W. M.). **The control of Apple scab: Allington Pippin, and Newton Wonder, 1934.**—*J. S.-E. agric. Coll., Wye*, xxxvi, pp. 55-61, 1 fig., 1935.

In further comparative spraying tests against apple scab [*Venturia inaequalis*: *R.A.M.*, xiii, p. 779] conducted in Kent in 1934, Allington Pippin trees given two pre- and two post-blossom applications of home-made Bordeaux mixture (8-12-100) and cotton-seed oil Bordeaux emulsion prepared as in the previous year's test [loc. cit.] showed, respectively, 2.3 and 3.2 per cent. scab-affected apples, as compared with 2.7 and 6.9 per cent. for Newton Wonder trees given the same treatments. In the unsprayed control plots the former variety averaged 31.8 and the latter 37.7 per cent. scabbed fruits. As infection was slight and occurred late it was not possible to ascertain any difference in the fungicidal efficiency of the two treatments.

AUSTIN (M. D.), JARY (S. G.), & MARTIN (H.). **Bordeaux mixture—nicotine combinations against aphis and Apple scab.**—*J. S.-E. agric. Coll., Wye*, xxxvi, pp. 95-99, 1935.

In spraying tests carried out in 1933 and 1934 apple trees given two pre-blossom applications of the combined fungicidal-insecticidal washes, Bordeaux-sulphite lye-nicotine and cotton-seed oil-Bordeaux-nicotine [see preceding abstract], showed at the end of the second season's treatment a lower aphis (*Anuraphis roseus*) infestation than the untreated controls and trees sprayed with ordinary Bordeaux mixture plus nicotine, but a heavier one than that generally found on trees treated with tar distillate washes. Both the modified Bordeaux washes gave as good control of scab [*Venturia inaequalis*] as did ordinary Bordeaux mixture. The cotton-seed oil-Bordeaux-nicotine spray caused less injury to the fruit and foliage than ordinary Bordeaux-nicotine or Bordeaux-sulphite lye-nicotine.

HALL (J. W.). **Special sulphur dust versus lime sulphur for Apple scab control.**—*Scot. J. Agric.*, xviii, 3, pp. 254-259, 1935.

In spraying tests [which are described, and the results of which are tabulated] conducted at two centres in Scotland from 1932 to 1934, lime-sulphur spray with casein added and a proprietary sulphur dust considerably reduced the incidence of apple scab [*Venturia inaequalis*], but no conclusions have as yet been reached as to the relative merits of the two treatments.

CARNE (W. M.) & MARTIN (D.). **Apple investigations in Tasmania: miscellaneous notes.**—*J. Coun. sci. industr. Res. Aust.*, viii, 2, pp. 71-75, 1935.

Continuing the account of their investigations into non-parasitic apple diseases [*R.A.M.*, xiv, p. 242], the authors refer to the confusion that exists in the naming of these disorders, especially the cool storage scalds [see next abstracts], and point out that superficial scald and deep or soft scald [*ibid.*, xiv, pp. 41, 42] are readily distinguishable. There

is no evidence that these conditions [which are described] as they occur in ordinary cool storage are related. Neither ever passes into the other. Confusion, however, has probably arisen when troubles occurring during storage experiments with abnormal atmospheres have been wrongly identified as 'scald'. This was confirmed by an experiment in which Sturmer apples stored for 10 weeks at 34° F. in sealed containers (carbon dioxide being allowed to accumulate to pre-determined amounts maintained within narrow limits by blowing in a calculated amount of air daily), developed in addition to brown heart a disorder that was apparently identical with Kidd's and West's deep scald [ibid., iii, p. 145] and Thomas's invasive alcohol poisoning [ibid., x, p. 606]. Every reduction of oxygen was accompanied by an increase in the severity of the condition, which developed independently of the brown heart. Other Sturmer apples in similar containers kept at room temperature did not develop either condition in two months, though the amount of carbon dioxide present rose to 38 per cent. in 30 days. The apples with alcohol poisoning and those kept at room temperature developed a strong alcoholic flavour. That Kidd's and West's deep scald is not the deep scald of ordinary stores was recognized but not emphasized by Thomas, and has been overlooked by other workers.

The paper concludes with a table showing the differences observed by the authors between superficial scald, deep scald, and alcohol poisoning.

**PLAGGE (H. H.) & MANEY (T. J.). *Soggy breakdown of Winter Banana Apples*.**—*Phytopathology*, xxv, 7, pp. 730-731, 2 figs., 1935.

From a recent comparison of the soggy breakdown occurring in Winter Banana apples stored in Iowa at a low temperature (31° F.) [R.A.M., xiv, p. 592] with the condition known as soft scald [cf. preceding and next abstracts] in the Wealthy, Golden Delicious, and other varieties, the writers conclude that these two disorders are identical.

**ALLEN (F. W.) & MCKINNON (L. R.). *Storage of Yellow Newtown Apples in chambers supplied with artificial atmospheres*.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 146-152, 1935.

This is a report on the first season's work on the control of scald and internal browning in Californian Yellow Newtown apples [see preceding abstracts] by storing the fruit at 40° to 42° F. in an atmosphere containing 10 per cent. each of carbon dioxide and oxygen. Under these optimum conditions, determined as the result of experiment, the apples kept firm and green and the flesh moderately crisp and juicy, though the flavour was slightly impaired. The use of oiled paper, previously shown to have little value in reducing scald in this variety, did not appear appreciably to improve the condition of the fruit.

**ASKEW (H. O.). *The boron status of fruit and leaves in relation to 'internal cork' of apples in the Nelson district*.**—*N.Z. J. Sci. Tech.*, xvii, 1, pp. 388-391, 1935.

The boron content of Jonathan, Dunn's Favourite, and Dougherty apples on soils in certain localities of the Nelson district, New Zealand, where 'internal cork' or 'corky-pit' is prevalent [R.A.M., xiv, p. 592],

was found to be only about one-third as high as that of healthy fruit on an unaffected type of soil. The percentage of boron found in the different samples was inversely proportional to the severity of the disturbance. Boron deficiency is thought to be undoubtedly the primary cause of 'internal cork' on the soils in question.

**CROWELL (I. H.). Compilation of reports on the relative susceptibility of orchard varieties of Apples to the Cedar Apple rust disease.—**  
*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 261-272, 1935.

The scattered reports on the varietal reaction of apples to cedar apple rust (*Gymnosporangium juniperi-virginianae*) [R.A.M., xiv, p. 684] in 36 States of the American Union have been collected and are here presented in the form of a tabular list of nearly 200 varieties, the degree of susceptibility of which to the disease is indicated.

**OGILVIE (L.). The fungus flora of Apple twigs and branches and its relation to Apple fruit spots. I. Review of literature and preliminary experiments.—***J. Pomol.*, xiii, 2, pp. 140-148, 1935.

The author quotes from literature [36 titles of which are included in the bibliography appended] a number of cases in which the connexion between the fungus flora commonly occurring on the twigs and branches of apple trees in nature and fruit infection has been clearly established. A brief account is also given of his own preliminary experiments and observations in which he showed the capacity of certain apple branch and twig saprophytes (*Gloeosporium album* [R.A.M., iv, p. 174], *Diaporthe perniciosa* [ibid., xiii, p. 524; xiv, p. 249], and *Alternaria*) to cause spots and rots on apples.

**LIRO (J. I.). Finland: Apple powdery mildew (*Podosphaera leucotricha*).—***Int. Bull. Pl. Prot.*, ix, 7, p. 151, 1935.

Powdery mildew of apples (*Podosphaera leucotricha*) [R.A.M., xiv, pp. 639, 711] is stated to have been first detected in Finland in 1923, when prompt measures were adopted for its control [ibid., v, p. 190]. The disease reappeared, however, in a garden near Helsingfors in 1934, having been introduced on Swedish apple stocks in the previous year, and is considered seriously to endanger the Finnish apple-growing industry.

**WENZL (H.). Beobachtungen über die Anfälligkeit von Birnensorten gegen die Weissfleckenkrankheit (*Mycosphaerella sentina*). [Observations on the susceptibility of Pear varieties to the white spot disease (*Mycosphaerella sentina*).]—***Z. PflKrankh.*, xlvi, 6-7, pp. 305-316, 1935.

The exceptionally severe outbreak of white spot of pears (*Mycosphaerella sentina*) [R.A.M., xiv, p. 617] in Austria in 1934 afforded a favourable opportunity for the detailed study of varietal reaction to this disease. A table is given showing how the resistance or susceptibility of 89 varieties fluctuated according to the climatic and soil conditions of the six different nurseries included in the observations, indicating that ecological factors as well as hereditary tendencies are involved in the response of a given pear to infection by the fungus.

Of the varieties tested only Conference, Eva Baltet, Bergamotte, Fertility, and President Douard showed appreciable resistance to *M. sentina*, and of these only the two first named are resistant to scab [*Venturia pirina*], a much more serious disease than white spot in most fruit-growing districts. As in the case of *Entomosporium maculatum* [*Fabraea maculata*], the agent of leaf blight of quinces and pears [ibid., xii, pp. 181, 231], infection by *M. sentina* was found to be restricted to a comparatively narrow radius from the original site of invasion.

**BROOKS (F. T.) & BRENCHLEY (G. H.).** **A note on the recovery from silver-leaf disease of Plum trees on common Plum and Myrobalan stocks, respectively.**—*J. Pomol.*, xiii, 2, pp. 135–139, 1935.

The authors state that in an experiment, started in 1930 at East Malling, in which young plum trees, grafted on common plum and on myrobalan stocks, respectively, were artificially infected with *Stereum purpureum* [R.A.M., xiv, p. 375], the number of recoveries from the silver leaf disease thus induced was by August, 1934, significantly higher in trees on common plum than in those on myrobalan stocks [cf., ibid., xi, p. 59]. Reference is also made to observations recorded from 1921 to 1931 in a plum stock trial at East Malling which showed a higher proportion of recoveries from silver leaf disease in trees on common plum stocks (20 out of 23) than on the myrobalan (26 out of 41).

**KOCH (L. W.).** **Investigations on black knot of Plums and Cherries.**  
**IV. Studies in pathogenicity and pathological histology.**—*Sci. Agric.*, xv, 11, pp. 729–744, 4 pl., 1 fig., 1935. [French summary.]

In this paper, which concludes the series dealing with his studies on black knot of plums and cherries (*Dibotryon morbosum*) [R.A.M., xiv, p. 593], the author gives a tabulated account of inoculation experiments carried out from 1930 to 1934, inclusive. Out of a total of 622 plum and cherry current year branches which were inoculated with suspensions of ascospores or conidia through wounds penetrating to the cambium only 19 (3 per cent.) developed black knots, and of these 16 (84 per cent.) had been inoculated during the month of May, and 3 (16 per cent.) during June. All inoculations made during the remainder of the year gave negative results. While only one knot resulted from the inoculation of branches over one year old with material from the fruiting surface of a plum knot, three knots were produced on old branches of *Prunus domestica* by 'patch grafting' on them pieces of unswollen host tissue taken from just beyond the border of knots. All the artificially produced knots became visible in the autumn of the year of infection; many produced the *Hormodendrum* stage during the autumn and perithecia during the following winter and spring, thus completing the life-cycle of the parasite within one year.

These results are considered to confirm the conclusion arrived at previously [loc. cit.] that over 95 per cent. of black knots originate on the current season's wood, and to indicate that the period during which infection can take place in nature is very limited (May and June), presumably owing to the fact that, while temperature, relative humidity, and amount and type of inoculum are undoubtedly important factors

in the epidemiology of the disease, the condition of the host is the outstanding factor which limits infection.

Histological studies of the knots at all stages of development showed that soon after the cambial region in the current year's wood is reached by the fungus, hypertrophy and hyperplasia of the host tissues set in; as soon as the medullary rays in this region are invaded, instead of forming the usual elements the cambium produces a relatively large number of parenchyma cells which are many times their normal size, as well as scalariform tracheids, frequently in contact with the mycelium. Although the fungus advances through normal xylem tissues during the dormant period of the host, it does not cause visible hypertrophy during the winter. The study also showed that the host and parasite are capable of living in intimate contact with each other for about six or seven months before pathological effects become apparent.

Recent experiments indicated that excellent control of the disease may be obtained by spraying the trees at 'full bloom' with 1 in 50 lime-sulphur, in addition to the applications previously recommended at the delayed dormant and petal stages [ibid., xii, p. 705].

HUSZ (B.). **Gyümölcsfapermetezési kísérletek.** [Spraying experiments on fruit trees.]—*Bull. Éc. hong. Hort.*, i, pp. 8-22, 6 figs., 1935. [English summary.]

Almost perfect control of red spot (*Polystigma*) [*rubrum*] (*Polyphragma rubra*) on three plum varieties, viz., Prune and Prune Muscat of Beszterce and French Prune of Agen, was obtained in Hungary in 1934 by four applications (on 26th March, 24th April, and 4th and 16th May) of 0.5 or 1 per cent. Bordeaux mixture [*R.A.M.*, xiii, p. 454], lime-sulphur, and a combination of lime-sulphur and calcium arsenate.

The best control of apple diseases (chiefly *Podosphaera leucotricha*) [see above, p. 771] and pests in two years' trials was given by a combination of 1 per cent. lime-sulphur with lead arsenate paste (containing 8.75 per cent. arsenic) or (for the later applications) with calcium arsenate (0.25 per cent. Arzola) [cf. *ibid.*, ix, p. 46; xi, p. 253].

HARDING (P. L.) & HALLER (M. H.). **Peach storage with special reference to breakdown.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 160-163, 1935.

Physiological breakdown in stored peaches [cf. *R.A.M.*, ix, p. 789; x, p. 162], associated with a brown discolouration and mealiness of the tissues and insipidity of flavour, has been found to be most prevalent in the United States at a temperature of 40° F. At 31° to 32°, however, the fruit may be maintained in fair condition for periods of two to five weeks according to the variety, the shorter duration being indicated, for instance, for Belle, Champion, Hiley, and Carman, and the longer for New Jersey 66 and 12722, Late Crawford, and J. H. Hale.

TROTTER (A.). **Deperimenti del Pesco, per parassitismo sulle radici di una nuova Monotospora.** [Peach wilt due to root infection by a new *Monotospora*.]—*Ric. Osserv. Divulg. fitopat. Campania ed Mezzogiorno (Portici)*, iv, pp. 3-11, 2 pl., 2 figs., 1935.

In 1928, twelve 7-year-old grafted peach trees in an orchard of 700

growing at Salerno on land recently reclaimed by drainage suddenly wilted; a year later 150 were affected, and by 1933 only 100 still remained alive. The disease appeared suddenly each spring, causing a general yellowing and shedding of the leaves; fruiting ceased, and the trees rapidly withered and died. Apart from these symptoms, the only visible abnormality was that the cortex of the larger roots was conspicuously cracked in all directions and showed numerous large, raised lenticels, while the surface of the smaller roots was wrinkled.

Examination of the affected roots (in 1933) showed the presence of a hyaline, branched, apparently non-septate mycelium with hyphae 1.5 to 2  $\mu$  in diameter, throughout the diseased tissues. Smooth, dark, subglobose or ovoid aleuriospores 10 by 10  $\mu$  or up to 16 to 17 by 12 to 15  $\mu$ , with a wall 1.5 to 2  $\mu$  thick, and provided with a lighter area, probably a germination pore, were irregularly arranged on the hyphae; they were occasionally sessile, but usually borne on short, simple, hyaline aleuriophores somewhat thickened at the apex. No phialids or phialospores were seen. In culture aleuriospores were produced resembling those found in nature.

The fungus is considered to be a new species of *Monotospora*, and as it is regarded as being at least partly responsible for the death of the trees, it is named (with a Latin diagnosis) *M. parasitica*.

**HARRISON (T. H.). Technical notes. Occurrence in Australia of *Lambertella corni-maris* von Höhnel, a brown-spored parasitic Discomycete.—*J. Aust. Inst. agric. Sci.*, i, 2, p. 76, 1935.**

The author records the occurrence in September, 1934, of apothecia of *Lambertella corni-maris* [R.A.M., xiv, p. 451] on two mummified apricots at Bilpin, New South Wales.

**COLBY (A. S.). Inheritance of Gooseberry leaf infection.—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 397-399, 1 graph, 1935.**

The present report deals with varietal reaction to anthracnose [*Pseudopeziza ribis*] and leaf spot [*Mycosphaerella grossulariae*: R.A.M., xii, p. 640] in 1,301 gooseberry seedlings arising from the selfing and crossing of nine varieties. Factors for resistance to the two diseases (which appears to rest on a multiple basis) were shown to be carried by Transparent, Rideau, and Como, while several seedlings combined relative freedom from infection with the desirable qualities of spinelessness and large fruit.

**WOLF (F. A.). The perfect stage of *Cercospora rubi*.—*Mycologia*, xxvii, 4, pp. 347-356, 8 figs., 1935.**

A brief account is given of the author's investigations of *Cercospora rubi* [R.A.M., ix, p. 290] in North Carolina, where it is stated to be capable apparently of attacking both wild and cultivated species of *Rubus*, including raspberries, dewberries, and blackberries; it is also common and widespread in the eastern United States, where in certain years it causes severe defoliation of the hosts, especially in commercial plantings. The results of the studies showed that the conidial stage present on the leaves during summer is succeeded by a perithecial stage, the initials of which (archicarps with trichogynes) are laid down

together with spermogonia, from late August to the end of October. The hypophylloous black, spherical to flask-shaped spermogonia, 20 to 25  $\mu$  in diameter, contain myriads of rod-shaped spermatia, 2 to 3 by 1 to 1.5  $\mu$ . The perithecia matured on leaves kept out of doors throughout the winter, by late April or early May. They are sparse, hypophylloous, globose, semi-immersed but later erumpent, black, with a papilla-like ostiole, and measure only 40 to 60  $\mu$  in diameter. The asci are fasciculate clavate, with a short pedicel; paraphyses are not present. The ascospores are distichous, hyaline or sub-hyaline, curved, oblong-cylindrical, divided into two unequal cells, and 11 to 14  $\mu$  long. The perithecial stage (the genetical connexion of which with the conidial stage was proved in cultural studies) is named *Mycosphaerella dubia* [with a Latin diagnosis].

The taxonomic study of the conidial stage showed that the later species *C. septorioides* and *C. bliti* are identical with it, while *C. rubicola* and *C. garbiniana* may also prove to be further synonyms.

LUCKAN. **Himbeerrutenkrankheit.** [Raspberry cane disease.]—*Verb. Mitt. Landesverb. Sachsen Obstb.*, 1935, 7, p. 105, 1935.

The increasing susceptibility to cane blight (*Didymella applanata*) of the reputedly resistant Preussen raspberry [*R.A.M.*, x, p. 804] is stated to have greatly reduced the value of this variety for cultivation in Saxony. Only raspberry stock free from this disease may be sold under the regulations of the Reich Food Board. Crosses between raspberry and blackberry have constantly yielded progeny showing resistance to *D. applanata*, and the possibility of developing a desirable raspberry by this means should be considered.

HULL (R.). **Investigation of the control of spoilage of processed fruit by *Byssochlamys fulva*.**—*Rep. Fruit Veg. Pres. Sta., Campden, 1933-34*, pp. 63-73, [? 1935].

To investigate the presence of *Byssochlamys fulva*, an agent of spoilage in processed fruit [*R.A.M.*, xiii, p. 711], in a given material, advantage was taken of the resistance of the ascospore stage to heat. Samples of leaves, fruit, straw, and the like were collected in plugged sterile tubes, which were filled with hot potato-sucrose agar, acidified with hydrochloric acid to  $P_H$  3, heated in a water bath at 80° C. for 30 minutes, sloped, and incubated when set at 30°.

Positive infections were obtained from diseased and healthy strawberry leaves in April (35 and 13 per cent., respectively), from leaves and straw in July (20 and 4 per cent., respectively), from ripe berries (26 per cent.), from leaves of various soft fruits near Colchester (4 out of 150 tubes), from Kentish orchards (5 to 25 per cent.), from two factories, and from all the Gloucestershire plantations of raspberries, loganberries, black currants, gooseberries, and plums inspected.

Investigating the possibilities of control of *B. fulva* in the factory, its elimination from the field being evidently impracticable, the writer found that various powerful disinfectants were ineffectual for this purpose. It was experimentally shown that a temperature of 92° is necessary to kill the ascospores in 1½ minutes. An increase in the sucrose content of the medium up to 20 per cent. was found to render the spores

more resistant to heat, but at higher concentrations the germination rate declined. Further studies are required to determine the best means of combining a treatment destructive to *B. fulva* spores with the exigencies of the canning process.

PLAKIDAS (A. G.). **Factors responsible for the small Strawberry crop in Louisiana this year.**—*Plant Dis. Repr.*, xix, 8, pp. 132-134, 1935. [Mimeographed.]

One of the principal factors in the exceptionally low production (only 43 crates per acre) of the 1935 Louisiana strawberry crop is stated to have been the crown rot caused by *Sclerotinia sclerotiorum*, which appears to have been favoured by the long wet spells and low temperatures in February and March, while the constitution of the host was weakened by frost injury. Taking the strawberry-growing area as a whole, some 15 per cent. of the plants were more or less severely affected.

STEVENS (N. E.). **An attempted analysis of the economic effects of Cranberry diseases.**—*Plant Dis. Repr.*, xix, 8, pp. 112-128, 4 graphs, 1935. [Mimeographed.]

In this analytical study of the effects of disease on the American cranberry market from 1913 to 1933, inclusive, the writer's attention has been confined to the fruit rots and the even more important false blossom [R.A.M., xii, p. 231; xiii, p. 316]. At the very conservative estimate of an average reduction from decay of 25 per cent., a loss to the consumer is indicated of over 120,000 barrels, valued at \$750,000 per annum, while the loss to New Jersey alone from false blossom reached, during a 10-year period, 35,000 barrels per annum, apart from depreciation of capital value estimated at 25 per cent. The various factors involved in an inquiry of this nature are discussed under the following headings: size and quality of cranberry crop in relation to producer and consumer; and the position of (a) groups of growers, (b) the individual grower, and (c) the consumer.

SERRANO (F. B.). **Control of bacterial fruitlet rots of the Pineapple in the Philippines.**—*Philipp. J. Sci.*, lvii, 1, pp. 29-62, 1 pl., 1 diag., 1 graph, 1935.

Between 1927 and 1930, from 27 to 55 per cent. of the pineapple fruits grown in the Philippine Islands were attacked by bacterial fruitlet rot caused by *Phytonomas* [Bacterium] *ananas* or by *Erwinia* [*Bacillus*] *ananas* [R.A.M., xiv, p. 456] or both, 12 per cent. being a total loss.

Infection is favoured by incomplete closing of the eyes, fewness of the shoots around the fruit, allowing it to be bent to one side and become sun-scorched, high atmospheric temperature, and low fruit acidity, of which the first two and the last may perhaps be remedied by breeding and selection, the third by shading or by growing the fruit at elevations of about 2,000 ft., and the last, again, by the application of suitable fertilizers.

Very satisfactory control resulted from spraying the young fruits while in flower with Bordeaux mixture (3-4-50 during the first month,

4-5-50 afterwards) or lime-sulphur (33° Baumé, 1 in 80 during the first month, 1 in 70 subsequently) at fortnightly intervals for three to four months.

Under Bukidnon Province conditions two applications of potassium sulphate at the rate of 500 kg. per hect., made during the tenth and thirteenth months, reduced infection by approximately 16 to 17 per cent., increased the average weight per fruit by 0.2 kg., and raised the fruit acidity from  $P_H$  4 to 3.8. The evidence obtained strongly indicated that the increased acidity of the cell sap and firmness of the tissues induced by the potash treatment were responsible for the resistance shown.

**CRISTINZIO (M.).** *Alcune malattie erittogamiche del Nespolo del Giappone ed in particolare la 'ticchiolatura'.* [Some fungal diseases of Loquat and, in particular, scab.]—*Ric. Osserv. Divulg. fitopat. Campania ed Mezzogiorno (Portici)*, iv, pp. 25-50, 4 pl., 6 figs., 1935.

In this account of loquat diseases observed in southern Italy the author states that the serious scab disease (*Fusicladium dendriticum* var. *eriobotryae*) [*R.A.M.*, xii, p. 231] is most prevalent in compact, wet soils, hot, rainy seasons, and coastal areas. The affected trees are conspicuous by their sickly foliage; the young infected leaves are contorted, thickened, covered with black spots, and lacerated at the edges, and quickly fall; the older ones are holed and the edges torn but remain attached. The branches are also attacked and after two or three years become markedly rachitic, while the fruiting is impaired or destroyed, affected fruits being quite unsaleable. The fungus is usually confined to the epidermal cells forming a stroma 20 to 60  $\mu$  thick, which ruptures the cuticle and bears conidiophores, measuring 10 to 48 by 5 to 8  $\mu$  with conidia 16 to 30 by 5 to 7  $\mu$ .

*Sphaeropsis malorum* Peck [*Physalospora obtusa*: *ibid.*, xii, p. 396; xiv, p. 371] produces over the whole leaf surface round, yellowish, later blackish, finally grey, generally confluent spots with a dark rim. On the young branches it produces depressed areas on the bark which soon cracks and turns black. The lesions become cancerous and expose the woody tissues; if they girdle the branch, the part above rapidly withers. Black, unilocular, pyriform pycnidia, 500 to 1,200 by 200 to 500  $\mu$  in diameter, are formed on the affected tissues; the pycnospores are hyaline, later yellowish, finally fuliginous, oval, elliptical or slightly bow shaped, continuous, and measure 19 to 29 by 8.5 to 12  $\mu$ . Associated with these pycnidia on the branch cankers are others, subspherical-depressed in shape, measuring 200 to 600  $\mu$  in height and containing hyaline conidia, 18.5 to 27.5 by 8 to 12  $\mu$ . This type corresponds to *Macrophoma malorum* [*ibid.*, vi, p. 423]. Both fungi are regarded as true parasites.

*Ascochyta eriobotryae* [*ibid.*, xii, p. 396] was very prevalent near Naples on the leaves of otherwise healthy but debilitated trees; heavy and repeated infections caused premature defoliation. The affected leaves bore numerous round, chestnut, later light grey, erumpent, isolated, occasionally confluent spots with a dark rim. The semi-immersed, later erumpent pycnidia measured 150 to 400  $\mu$  in height,

and the cylindrical or ellipsoidal-elongated, frequently arcuate spores, slightly constricted at the median septum, measured 8 to 12 by 2 to 3.5  $\mu$ .

Brief reference is also made to a few other loquat diseases reported by different workers, including *Bacillus amylovorus* [ibid., xiii, p. 424], *Phoma eriobotryae* [ibid., xiii, p. 175], and *Phytophthora parasitica* [f. *eriobotryae*: ibid., vii, p. 186].

TAI (F. L.) & CHEO (C. C.). **A dry rot of Pomegranate fruit caused by *Zythia versoniana* Sacc.**—*J. hort. Ass. China*, i, 1, pp. 203-217, 12 figs., 1934. [Received October, 1935.]

This is an expanded account of the destructive dry rot of pomegranates (*Punica granatum*) caused by *Zythia versoniana* in China [R.A.M., xii, p. 641]. The pyrites-yellow pycnidia are densely aggregated, erumpent, 56 to 144 by 62 to 131  $\mu$ , and the hyaline, fusoid pycnospores measure 13 to 19 by 3 to 5  $\mu$ . The minimum, optimum, and maximum temperatures for the growth of the fungus were found to be about 12.5°, 24° to 28°, and 35° C., respectively. The dead fruits left hanging on the trees constitute an important source of primary infection since the dormant mycelium in them resumes activity in April, producing crops of fresh pycnidia. The application of Bordeaux mixture considerably reduced the incidence of infection by *Z. versoniana* in 1933. The Yushutze pomegranate has been found resistant to the dry rot, while Funpi is very susceptible.

MILANEZ (F. R.). **Notas sobre a galha lenhosa da Goiabeira.** [Notes on a woody gall of the Guava.]—*Rodriguésia*, i, 1, pp. 3-7, 7 pl., 1935.

A detailed account is given of the author's histological studies of large woody galls on the trunk of guava trees (*Psidium guajava*), which are stated to be common in the Minas Geraes State of Brazil. He attributes the origin of these galls to the presence in the cambium of a fungus (presumably a Phycomycete) which he was not able to identify as it could not be cultured from the material submitted to him.

TAVERNETTI (J. R.). **Characteristics of the resistance type soil sterilizer.**—*Agric. Engng St. Joseph, Mich.*, xvi, 7, pp. 271-274, 1 fig., 1 diag., 6 graphs, 1935.

Summing up the results of experiments conducted in California to ascertain the behaviour of the 'resistance' (electric) soil sterilizer [R.A.M., xiv, p. 519] under varying conditions of soil and equipment, the writer concludes that the advantages of this method lie in the simplicity and inexpensiveness of the apparatus, its easy, rapid, and semi-automatic operation, and the uniform heating obtained. Its two serious drawbacks are the risk of electric shock (especially with the bench sterilizer, which cannot, in contrast to the box type, be enclosed) and variable electric load.

DAVIES (C.) & SMYTH-HOMEWOOD (G. R. B.). **Investigations on machinery used in spraying. Part II. Nozzles.**—*J. S.-E. agric. Coll., Wye*, xxxvi, pp. 62-85, 4 pl., 12 figs., 2 graphs, 1935.

Using the method previously described for the accurate measurement

of a sprayed area of foliage [*R.A.M.*, xiii, p. 790], the authors carried out a series of tests [the results of which are tabulated] on apple trees 10 to 20 ft. high under commercial conditions in the field, the data obtained showing an average cover of about 78 per cent. The area covered was estimated by placing a  $\frac{1}{10}$  in. mesh screen over the disk record and counting the number of squares showing any deposit. The 'spray cover efficiency' (based on area covered, atomization [graded as fine, medium, and coarse, with a maximum value of 60], and uniformity [even, fair, uneven, maximum value 100]) averaged 62 per cent. When different pressures and nozzle settings were similarly tested the cover ranged from 60 to nearly 92 per cent. In laboratory tests of different makes and patterns of nozzles it was found that the increased weight and greater back pressure which result from the use of multiple clusters of nozzles on one lance can largely be obviated by employing nozzles made of some light metal such as duralumin alloy and much shorter lances. As a pair of nozzles, side by side, moved horizontally produces a narrower, more heavily drenched bank of spray than when moved perpendicularly, it is recommended that three nozzles should be used so mounted on one lance that the orifices form an equilateral triangle.

Emphasis is laid on the importance of basing the manner in which nozzles are grouped on the lance upon the conditions contributing to the most efficient spraying; it is fallacious to assume that merely using two or more in a cluster must result in a larger area being covered in a given time.

**Schädlingsbekämpfung in Frankreich.** [Pest control in France.]—  
*Chem. Industr., Berl.*, lviii, 16, pp. 293-294, 1935.

The total loss sustained annually by French agriculture through plant diseases and pests is estimated at an average of M. 1,500,000,000. In the absence of exact information only a rough estimate of the value of the annual French production of plant protectives can be made, viz., M. 25,000,000 to 30,000,000, of which 60 to 70 per cent. consists of copper sulphate, 10 to 20 per cent. of arsenates, and 20 to 30 per cent. of miscellaneous substances, while imports are estimated at M. 5,000,000 to M. 6,000,000. In addition to smaller quantities of other preparations, 70,000 tons of copper sulphate, valued at M. 20,000,000 in 1934, are used annually in French vineyards; the home manufacture of this substance has been widely extended during the last few years. Data regarding arsenates and miscellaneous substances are also given.

**RECKENDORFER (P.). Zur Physikochemie der Kupferkalkbrühe (Haftfähigkeit als Quellungserscheinung).** [On the physico-chemistry of Bordeaux mixture (adhesiveness as a function of swelling).]—  
*Z. PflKrankh.*, xlv, 6-7, pp. 341-353, 2 graphs, 1935.

The writer describes the technique and discusses the results of his experiments to determine the 'carrier' of the property of adhesiveness in Bordeaux mixture [*R.A.M.*, xi, p. 524; xii, p. 174; xiii, p. 597], and further to define the influence on this character of the lime used in the preparation of the compound. It was found that the adhesiveness of spray materials depends on the colloidal character of the spray deposit. Irreversible colloidal deposits show a tendency after drying to be almost

or quite incapable of further swelling and consequently are not easily washed off. The dehydrated hydrogel deposit of Bordeaux mixture owes its resistance to washing off by rain solely to its physico-chemical resistance to swelling in response to atmospheric factors.

In order to compare the adhesiveness of Bordeaux mixtures (with copper-lime ratios of 1:1, 1:1.5, and 1:2) the swelling capacity of their dried deposits was recorded on the rotating drum of a special apparatus which is described in detail. The adhesiveness of the mixtures was found to increase parallel with the rising lime content to reach a maximum in the region of molecular saturation (phase III<sub>2</sub>; corresponding to a copper sulphate-lime ratio of 1:1.5), followed by an immediate decline, the swelling of the three mixtures increasing to relative constant values of approximately 12.0, 2.1, and 5.8, respectively, after 10 hours. However, the adhesiveness of the only mixture of practical importance (1:1, phase III<sub>1</sub>) is quite adequate, the amount of the fungicide washed off being inappreciable from the standpoint of plant protection, yet sufficient to obviate any risk of injury to health from its consumption with the harvested product.

WOOD (JESSIE I.). **Estimates of crop losses from diseases in the United States.—1931, 1932, and 1933.**—*Plant Dis. Repr. Suppl.* 87, 82 pp., 1935. [Mimeographed.]

The following are some of the data on the losses due to disease among the more important American crops in 1931, 1932, and 1933 [R.A.M., xi, p. 769; xiii, p. 316]. The total wheat production for the three years amounted to 892,271,000, 741,076,000, and 527,413,000 bushels, respectively, the losses from all diseases during the same period being estimated at 66,091,000, 50,629,000, and 26,174,000 bushels, respectively. The total maize production for 1931 was 2,556,863,000 bushels with an estimated loss from all diseases of 200,584,000 bushels, the corresponding figures for 1932 and 1933 being 2,906,873,000 (291,347,000) and 2,330,237,000 (234,555,000) bushels, respectively. In 1931, 1932, and 1933 the potato yields totalled, respectively, 376,248,000, 358,009,000, and 317,143,000 bushels, with estimated losses of 57,766,000, 78,189,000, and 39,794,000 bushels, respectively. Figures are given of the losses from the chief individual diseases of each crop.

STOREY (H. H.). **Virus diseases of East African plants. I. Introduction.**—*E. Afr. agric. J.*, i, 1, pp. 63–68, 1935.

In this paper, designed to be the first of a series upon the virus diseases of crop plants in East Africa, the author discusses in popular terms some of the characteristic features of virus diseases and the principles of their control in agricultural crops.

KÖHLER (E.). **Viruskrankheiten.** [Virus diseases.]—*Kranke Pflanze*, xii, 7–8, pp. 109–112, 1935.

An account is given in semi-popular terms of some recent important discoveries in connexion with virus diseases of economic and ornamental plants, with special reference to those bearing on the cultivation of these crops in Germany.

TROTTER (A.). **Le 'virosi' del Cestrum parqui L'Hérit.** [Virus diseases of *Cestrum parqui* L'Hérit.]—*Ric. Osserv. Divulg. fitopat. Campania ed Mezzogiorno (Portici)*, iv, pp. 18-24, 1 pl., 1 fig., 1935.

*Cestrum parqui* hedges growing in different parts of the Campagna were recently observed to show leaf abnormalities, consisting of various combinations [which are described] of surface wrinkling, edge waving, and chlorosis, apparently due to virus attack. The cells of the affected tissues showed inclusions and other cytological modifications typical of a virus disease. The author suspects that the disease, which resembles in some respects potato leaf roll and mosaic, has been acquired by this Solanaceous host from potato crops in the vicinity.

BALD (J. G.). **Statistical aspect of the production of primary lesions by plant viruses.**—*Nature, Lond.*, cxxxv, 3424, p. 996, 1935.

Referring to the recent paper in which Youden, Beale, and Guthrie suggest that the relation between the numbers of local lesions on the leaves of virus-inoculated plants and the relative concentrations of virus particles in the inoculum may be expressed as  $y = N(1-e^{-ax})$  [R.A.M., xiv, p. 601 and next abstract], the author points out that although this equation is, in all probability, fundamentally correct, and in the data cited by Youden *et al.* the values for the low dilutions are fitted by the equation, the calculated values for the higher ones are almost uniformly too small, and sometimes far beyond the limits of the experimental error. To plot the values of  $\log(N-y)$  against concentration and show that in selected cases the values fall approximately on a straight line gives a misleading idea of the fit, since when  $N$  is much greater than  $y$ ,  $y$  may vary widely without causing wide departures from a straight line. Experimental data obtained by the writer and Samuel from dilutions of tobacco mosaic juice indicate that the relation of number of lesions to concentration could not be expressed by the function. The evidence obtained has shown that the equation applies only to very carefully purified suspensions of virus, distortions existing with samples so far purified that only slight pigmentation remained.

YOUDEN (W. J.). **Statistical aspect of the production of primary lesions by plant viruses.**—*Nature, Lond.*, cxxxv, 3426, p. 1075, 1935.

The failure of Samuel and Bald to reconcile their experimental data concerning the production of primary lesions by plant viruses with the values calculated from the equation of Youden and his collaborators [see preceding abstract] is thought to be attributable mainly to a lack of conformity between the dilution data of the first-named workers and the curves obtained by others. It is true that the equation gives low values at high dilutions, but there is no indication that its application is limited, at least over a considerable range of dilution, to highly purified virus preparations. The writer concludes that Samuel's and Bald's data cannot be used to condemn the validity of the equation.

CHESTER (K. S.). **Serological evidence in plant-virus classification.**—*Phytopathology*, xxv, 7, pp. 686-701, 2 figs., 1935.

This is an expanded account of the writer's experiments, conducted

chiefly by means of the precipitin and complement-fixation techniques, to determine the serological relationships between a number of plant viruses, a preliminary note on which has already appeared [R.A.M., xiv, p. 385]. In addition to those previously mentioned, potato mild mosaic and Osborn's pea mosaic virus No. 2 [ibid., xiv, p. 486] were found to represent distinct entities. The veinbanding virus of potato [ibid., xiv, p. 723] and cucumber mosaic [ibid., xiv, pp. 659, 660] appear from their strong mutual reactions, as well as from the outcome of inoculation tests, to be merely strains of a single virus which probably also includes Valleau's (Kentucky) tobacco virus 10729. Precipitin tests indicated a much more distant serological relationship between tobacco mosaic and severe etch of tomato [ibid., viii, p. 270]. Osborn's pea mosaic viruses Nos. 2 and 3, which were shown by these tests to differ from all the others studied, appear from their serological reactions to be strains of the same virus type. The usefulness of serologic reaction in the classification of viruses was confirmed by tests of virus samples submitted as unknowns, and the technique is considered to afford the chief line of attack in the study of the chemical basis of specificity.

CHESTER (K. S.). *The antigenicity of the plant viruses*.—*Phytopathology*, xxv, 7, pp. 702-714, 4 graphs, 1935.

As already shown by Helen P. Beale [R.A.M., xiv, p. 197], the tobacco mosaic precipitin reaction was found in the writer's serological experiments [see preceding abstract] to be independent of host species within the Solanaceae, while Birkeland's observation [ibid., xiii, p. 545] that purified tobacco mosaic virus retains its specific precipitin reactivity was also confirmed.

When the tobacco mosaic, tobacco ring spot [ibid., xiv, p. 659], potato veinbanding, and potato ring spot [ibid., xiv, p. 385] viruses are inactivated either by series of progressive strengths of silver nitrate, potassium permanganate, or chloramine T or by heating for ten minutes up to 100° C., and when tobacco mosaic is inactivated by successive changes of the hydrogen ion concentration from  $P_H$  0.5 to 12.0 or progressively fractionated by filtration, in each case the serological reactions are maintained during the presence of the virus in an active form, diminishing in strength *pari passu* with the loss of infectivity, and disappearing at the very point at which the virus becomes no longer demonstrable.

When the tobacco mosaic and potato latent mosaic (healthy potato or X) [ibid., xiv, p. 714] virus-immune sera are tested with their respective viruses propagated in hosts such as phlox, zinnia, and beet, only very distantly related to those used in serum preparation, serological reactions are still demonstrable, being correlated with the amount of inoculum independently of the hosts used.

Discussing these findings, and other evidence available concerning the antigenicity of the plant viruses, the writer thinks it may reasonably be concluded that the antigens responsible for the serological reactions under observation are the viruses themselves, and not the normal or derived constituents of diseased plants.

MATTIROLO (O.). **Un nuovo simbionte del Pioppo canadese. Nota I.**

**Ancora sulla simbiosi del 'Tuber magnatum Pico' con i 'Pioppi canadesi' e osservazione sul processo di maturazione dei 'funghi ipogei'. Nota II.** [A new symbiont of the Canadian Poplar. Note I. A further report on the symbiosis of *Tuber magnatum* Pico with Canadian Poplars and observations on the process of ripening in hypogeous fungi. Note II.]—*Ann. Accad. Agric. Torino*, lxxvii, pp. 131-146, 1 pl., 1935.

Symbiosis has been found to occur in Piedmont between Canadian poplars (*Populus virginiana* Durr. and *P. monilifera* Ait. [*P. balsamifera* L.]) and *Tuber magnatum* in addition to *T. borchii* previously recorded [R.A.M., xiii, p. 718]. The association is confined to alluvial, argillaceo-calcareous soils. Observations are made on the changes of odour (connected with glycogen reaction) and colour accompanying the ripening process in various kinds of truffles.

CHALLENGER (F.) & HIGGINBOTTOM (CONSTANCE). **The production of trimethylarsine by *Penicillium brevicale* (*Scopulariopsis brevicaulis*).**—*Bio-chem. J.*, xxix, 7, pp. 1757-1778, 1935.

A detailed, fully tabulated account is given of the writers' experimental studies on the mechanism of biological methylation by the mould *Scopulariopsis brevicaulis* [R.A.M., xii, p. 713]. No definite conclusion was reached in regard to the mode of formation of trimethylarsine from arsonoacetic acid, but it is presumed, on the basis of these and other investigations, to be of an enzymic nature.

CHALLENGER (F.). **The biological methylation of compounds of arsenic and selenium.**—*J. Soc. chem. Ind., Lond.*, liv, 28, pp. 657-662, 1935.

A full review and discussion are given of the literature on the methylation by moulds, especially *Scopulariopsis brevicaulis*, of arsenic and selenium compounds in the pigments of wall-papers, plasters, and the like [see preceding abstract].

VARADARAJA IYENGAR (A. V.). **Some biochemical factors of disease resistance in plants.**—*Curr. Sci.*, iv, 1, pp. 47-50, 1935.

Some general observations, amplified by references to the relevant contemporary literature, are made on the contribution of biochemical factors to disease resistance in plants. The subject is discussed under the following headings: nature of disease-resistant factors; isolation of inhibitory substances; individual chemical compounds in relation to disease resistance; reaction of tissue fluid; enzymes in relation to disease resistance; and disease susceptibility and nutritional factors.

ARATA (MARIA). **Il meccanismo dell'immunità nei vegetali.** [The mechanism of immunity in plants.]—Reprinted from *Boll. Ist. sieroter. Milano*, xiv, 6-7, 38 pp., 26 figs. (2 col.), 1935. [German summary.]

This paper, describing the author's investigations on the defensive reactions of vaccinated and unvaccinated beans [*Phaseolus vulgaris*] towards *Botrytis cinerea*, is the full Italian version of a shorter one already noticed from other sources [R.A.M., xiv, p. 602].

McCREA (ADELIA). **A supplementary note on longevity of *Aspergillus oryzae* and *Rhizopus nigricans*.**—*Pap. Mich. Acad. Sci.*, xx, pp. 79-80, 1935.

In 1919, 1927, and 1932, the writer readily obtained viable cultures on a number of standard media from dry 'spore dust' of *Aspergillus oryzae* [R.A.M., xiv, p. 648], sealed in a tube in 1897. The fungus also remained alive for ten years on 4 per cent. glucose agar in a test-tube. *Rhizopus nigricans*, an accidental contaminant of the original culture of *A. oryzae*, survived the 30-year test in 1927 but was no longer viable in 1932 [cf. *ibid.*, xi, p. 318].

BARRUS (M. F.) & CROSBY (C. R.). **Control of diseases and insect pests of Potatoes on Long Island.**—*Ext. Bull. Cornell agric. Exp. Sta.* 288, 26 pp., 4 figs., 1935.

This bulletin gives an outline, for the special use of Long Island potato-growers, of control measures, the efficacy of which has been established in practice against virus, bacterial, and fungal diseases, as well as against insect pests of the crop. It also gives a brief, popular account of the more important parasites and virus diseases of the potato in Long Island.

BRENTZEL (W. E.). **Types of Potato virus diseases in North Dakota.**—*Bull. N. Dak. agric. Exp. Sta.* 282, 23 pp., 12 figs., 1935.

Popular notes are given on the following virus diseases affecting the North Dakota potato crop: spindle tuber, rugose, mild, crinkle, leaf-rolling, and interveinal mosaics, leaf roll, mottled and unmottled curly dwarf, and witches' broom [cf. R.A.M., xiv, p. 714]. The control of the diseases, based on the elimination of the insect vectors, roguing, and selection by tuber-indexing, is briefly discussed.

BARTON-WRIGHT (E. C.), COCKERHAM (G.), & M'BAIN (A. M.). **Virus disease research.**—*ex Rep. Scot. Soc. Res. Pl. Breed. Ann. gen. Meet. 25th July, 1935*, pp. 14-17, 1935.

Further investigations at Corstorphine Plant-Breeding Station and the North of Scotland Sub-Station into the physiology of potato virus diseases [R.A.M., xiii, pp. 321, 721] showed that the main differences between healthy and crinkle plants are that protein synthesis occurs later in the growing season in diseased than in healthy plants, that protein hydrolysis in crinkle plants is retarded, and that affected plants show interference with the normal channel of transport of nitrogen fractions.

In further breeding work, the Shamrock variety, resistant to virus diseases, was selfed and over 300 seedlings were raised with the object of finding out whether any segregation had occurred. The seedlings were classified as (a) apparently healthy or (b) virus infected. Evidence was obtained of two distinct types of resistance, viz., resistance to natural infection and tolerance of the pathogen after infection. No potato variety or seedling has been found to possess complete resistance to all the chief potato viruses, but a high degree of tolerance to individual viruses has been exhibited by some of them.

A comprehensive test of the copper strip method of discriminating between healthy and degenerate tubers [see next abstract] made on 600 tubers of 53 varieties showed the method to be of little value.

**KAHO (H.). Zur Physiologie der Kartoffel. II. Ein Beitrag zur Diagnose abbaukranker Knollen.** [On the physiology of the Potato. II. A contribution to the diagnosis of degenerate tubers.]—*Phytopath. Z.*, viii, 4, pp. 323-335, 1935.

Continuing his studies [*R.A.M.*, xiv, p. 465] on the physiology of potato 'degeneration' in Estonia (where this condition is stated to be economically unimportant, mosaic being infrequent and leaf roll absent), the writer determined the oxidation-reduction rate of the tubers of nine healthy and three 'degenerate' varieties in an alcoholic guaiacum solution, details of the method adopted being given. The former group, including Imperator, Odenwälder Blaue, Deodara, Majestic, and Allerfrüheste Gelbe, responded so much more rapidly to the oxidation-reduction process (in 11 to 22 minutes) than the latter, comprising Bravo I and II and Imperator (which required 81 to 89 minutes), that a direct correlation may be established between velocity of reduction and vitality.

Tests were also conducted by the sheet copper method of Bechhold and Erbe [*ibid.*, xiii, p. 649], which proved, however, less reliable for the end in view owing to the relative scantiness of melanin formation by potato tubers under the prevailing favourable ecological and climatic conditions of Estonia.

**PFANKUCH (E.). Zur Biochemie des Kartoffelabbaues. III. Mitteilung : Ascorbinsäure, Glutathion und Zucker.** [A contribution to the biochemistry of Potato degeneration. Note III: Ascorbic acid, glutathion, and sugar.]—*Biochem. Z.*, cclxxix, 1-2, pp. 115-130, 1935.

No increase over the normal content of glutathion (2 to 5 mg. per cent.) and ascorbic acid (15 to 20 mg. per cent.) could be detected in the expressed juices of 'degenerate' potato tubers [*R.A.M.*, xiv, p. 650], the enhanced reducing capacity of which must be ascribed, therefore, to an augmented dehydrogenase activity.

In the expressed juices both of 'degenerate' potato tubers and of those (Klein-Spiegeler Wohltmann) artificially inoculated with the leaf roll virus [*ibid.*, xiii, p. 533] the ratio of cane to reducing sugar was increased, an effect that may follow either a rise in the cane sugar concentration or a reduction in that of the monoses. The manner in which this change, as well as the increased dextrin content of 'degenerate' tubers, are brought about is discussed.

**QUANJER (H. M.) & GÄUMANN (E.). Versuche über den Einfluss des Klimas auf den Gesundheitszustand der Kartoffelpflanze.** [Experiments on the influence of climate on the state of health of the Potato plant.]—*Phytopath. Z.*, viii, 4, pp. 307-321, 1 fig., 5 diags., 1935.

Following a concise introductory survey of the literature on ecological factors in relation to potato degeneration [*R.A.M.*, xiv, pp. 54, 387,

and preceding abstracts], the writers give an account of preliminary experiments in Switzerland to determine the influence of altitude on the incidence, virulence, and course of mosaic (anecrotic type) [ibid., x, p. 746; xiv, p. 250].

The disease was found to persist in Eigenheimer tubers transferred from Wageningen, Holland, to the Alps, so that the practice of introducing infected material into relatively disease-free mountain regions should be discontinued as offering no hope of a cure. At a height of 1,680 m. above sea-level infection was transmitted from diseased plants to their healthy neighbours, though to a much lesser extent than in the foothills (455 m. above sea-level), where 10 per cent. mosaic may lead to the infestation of practically the entire crop in a year without any signs of physiological deterioration. An intensely severe form of the disease, accompanied by general stunting, may develop in addition to the common type in the mountains, possibly as a result of mixed infection [ibid., xiv, p. 388]. At 1,680 m. above sea-level the mosaic introduced in 1932 had not spread by means of fresh infections by the summer of 1933, whereas at 455 m. a considerable extension of the common mild symptoms was observed.

DUOMET (V.), FOËX (E.), & ALABOUVETTE (L.). **Les maladies de la Pomme de terre.** [Potato diseases.]—Issued by Minist. Agric. France, 40 pp., 20 col. pl., 1 fig., 1 diag., 1935.

Semi-popular notes are given on a number of well-known potato diseases [the symptoms of which are illustrated by excellent coloured plates] occurring in France, with directions for their control. A useful key and some observations on selection and storage are appended.

CRISTINZIO (M.). **Le 'virosi' delle Patate 'Riccia' e 'Biancona' di Napoli nell'annata 1934.** [The virus diseases of Neapolitan 'Riccia' and 'Biancona' potatoes in the year 1934.]—*Ric. Ossvz. Dirulg. fitopat. Campania ed Mezzogiorno (Portici)*, iv, pp. 51-65, 2 pl., 3 figs., 1935.

In a tour of inspection made recently in the vicinity of Naples to ascertain whether the decline in the yields of the formerly highly satisfactory Riccia and Biancona potato varieties might be due to virus diseases it was ascertained that the latter variety showed 15 to 35 per cent. leaf roll, 2 to 12 per cent. rugose mosaic, and 2 to 5 per cent. crinkle A [R.A.M., xiv, p. 681], according to the locality; ordinary mosaic occurred on a few plants of this variety in two areas only. The Riccia variety showed 6 to 8 per cent. crinkle A, little or no rugose mosaic, and 1 to 2 per cent. witches' broom, the principal disease attacking this variety being dwarfing, probably due to some unidentified virus. The incidence of these virus diseases was sufficient to account for a reduction of yield by at least 20 to 30 per cent.

PORTER (D. R.). **Insect transmission, host range, and field spread of Potato calico.**—*Hilgardia*, ix, 8, pp. 383-394, 7 figs., 2 diags., 1935.

A concise account is given of continued experiments at the California Agricultural Experiment Station [R.A.M., xi, p. 320] on the transmission of potato calico, the results of which demonstrated conclusively

that the potato aphid (*Macrosiphum solanifolii*) [*M. gei*] is a vector of this disease. Calico was further shown to be transmissible by mechanical inoculation to tomato, pepper (*Capsicum annuum*), eggplant [ibid., xii, p. 615], *Datura stramonium*, and *Petunia* sp., but not to or from lucerne and certain weeds (*Ambrosia* and *Amaranthus* spp.), though these, when growing in the vicinity of calico-infected potatoes, frequently exhibit symptoms very suggestive of the disease. The results of experiments at Santa Clara, Stockton, and Davis clearly demonstrated the natural spread of calico on potato in the field. To test the effect of the date of sowing on the spread of calico, identical stock (halved tubers) was planted in 1931 at Stockton on 12th April, and at Davis on 16th June, previous experiments having shown that the rate of spread of potato virus diseases is practically the same in the two localities; the results showed that late planting reduced the percentage of spread from 55 at Stockton to 7 at Davis. This is considered to be a further confirmation of the fact established in a recent communication from the author [ibid., xiv, p. 714] that late planting in the Sacramento and San Joaquin valleys of California often produces potato seed stock relatively free from virus infection and capable of producing high yields in the next generation.

It is stated that, although still present in all the important potato-growing districts of California, calico has caused very slight losses during 1932, 1933, and 1934, maximum infection having been less than 3 per cent., with an average of less than 1 per cent. for the whole of the State. Besides White Rose, the most important variety grown, the disease has also been found on Bliss Triumph, Idaho Rural, and Garnet Chili, and it has been experimentally transmitted to a number of other varieties, including Early Rose, Green Mountain, and Irish Cobbler.

LINDFORS (T.). *Potatiskräftan i Sverige : dess utbredning och bekämpande intill år 1935.* [Potato wart in Sweden; its distribution and control up to the year 1935.]—*Medd. Växtskyddsanst. Stockh.* 11, 5 graphs, 3 maps, 1935.

A tabulated account is given of the distribution of potato wart [*Synchytrium endobioticum*] in Sweden [R.A.M., xi, p. 533; xii, p. 51; xiii, p. 799] since its discovery in the Stockholm province in 1912, followed by apparently complete disappearance until 1928. At the time of writing the centres of infection throughout the country numbered 360, covering an area of 4,329 hect. The province of Halland shows the heaviest infestation, with 100 centres covering 2,026 hect., followed by Blekinge with 78 (545) and Örebro with 52 (540). After the intense activity of the fungus in 1928, when 97 fresh centres (1,020 hect.) were declared to be infected, there was a successive decline until 1931, when only 24 new cases were detected, followed by another rise to 79 in 1934.

Instances are cited showing that the spread of wart disease is largely effected by means of seed potatoes, while other important sources of dissemination include manure, domestic animals (especially poultry), agricultural implements, and running water. There is reason to believe that crows and other birds may be implicated in the transmission of the fungus over long distances.

Evidence of viability of the spores of *S. endobioticum* extending over a period of 13 years in Finland and 10 years in Denmark is quoted. Among the Solanaceae other than potato found susceptible to wart disease in inoculation experiments [cf. *ibid.*, xiii, p. 652] are tomato and the weeds *Solanum nigrum*, *S. dulcamara*, and *Hyoscyamus niger*, none of which, however, would appear to be of practical importance in the spread of infection.

The results [which are briefly summarized] of soil disinfection experiments against wart disease in Sweden and elsewhere have not been generally encouraging from a practical standpoint. The legislation against *Synchytrium endobioticum* is discussed with special reference to its operation in the Scandinavian countries. From 1929 to 1935, inclusive, a total of 241,472 kg. of potatoes belonging to such immune varieties as Majestic, Arran Consul, King George V, Ackersegen, Erdgold, Hindenburg, and Parnassia was supplied under official supervision to growers in the infested areas of Sweden, and 13,000 kg. to those in other districts. All these are late varieties (except Parnassia, used for industrial purposes only) and the need for immune early sorts suitable for Swedish conditions is keenly felt. Juli and Dargill Early are slightly backward in development and their yellow flesh is also unacceptable, while Arran Crest and Arran Pilot are susceptible to a number of diseases and keep badly in Sweden.

COLLINS (E. J.). **The problem of immunity to wart disease (*Synchytrium endobioticum* (Schilb.) Perc.) in the Potato.**—*Ann. Bot., Lond.*, xlix, 195, pp. 479-491, 1935.

In this paper the author compares the results [which are tabulated] obtained by him at Ormskirk from 1915 to 1927 in tests for immunity from potato wart disease (*Synchytrium endobioticum*) [*R.A.M.*, i, p. 131; cf. also xiv, p. 389] of potato seedlings raised in breeding work for resistance to late blight (*Phytophthora infestans*), with those reported by Salaman and Lesley [*ibid.*, iii, p. 169], and recently by Lunden and Jørstad [*ibid.*, xiv, p. 251], in an attempt to throw some light on the problem of the inheritance of genetic factors for wart resistance. In his own trials selfed Majestic (immune) seedlings segregated on a basis closely approximating a 1 susceptible to 3 resistant ratio, and results of crosses of Majestic and other immune varieties tended to support this assumption. In the immune  $\times$  immune class, a cross of Defiance  $\times$  Leinster Wonder produced five seedlings, all of which proved to be immune, while the majority of the other crosses tested segregated in a ratio approximating 1 S to 3 R. In the selfed susceptible class he could only use the offspring from two proved susceptible seedlings (each obtained from crossing two immune varieties), one of which gave an entirely susceptible progeny, and the second gave 26 susceptible and 3 resistant descendants. These figures are taken to indicate complete susceptibility of the offspring. In the susceptible  $\times$  susceptible class the results showed that British Queen, President, and Edgecote Purple are pure susceptible varieties. In the immune  $\times$  susceptible class a total of 174 seedlings tested gave 82 S, 70 R, and 22 plants useless for the tests because of lack of vigour. While in some of the families there was an indication of segregation on the basis of an equality ratio, the group

as a whole is less amenable to explanation in view of the wide fluctuations which were observed. In the susceptible  $\times$  immune class 184 seedlings gave 81 S, 82 R, and 21 'too poor' plants, a very close approximation to equality in segregation; there were, however, outstanding examples of individual deviation, as, for instance, in the Epicure  $\times$  Majestic cross, which gave 1 S to 8 R.

In the author's opinion the bulk of the evidence appears to be in favour of a simplification of the problem of the inheritance of resistance to potato wart disease rather than the multiplication of factors for immunity and others for inhibiting them, each variety of potato being a law to itself.

**BLODGETT (F. M.), MADER (E. O.), BURKE (O. D.), & McCORMACK (R. B.). Three years' results using Bordeaux mixture with reduced amounts of lime as a Potato spray.**—*Amer. Potato J.*, xii, 7, pp. 171-177, 1935.

In continued experiments with Rural potatoes in New York State and with Green Mountains on Long Island [*R.A.M.*, xii, p. 653; xiv, p. 606] the authors confirmed the beneficial effect on yield of spraying the potatoes with Bordeaux mixture even in the absence of late blight [*Phytophthora infestans*], and also showed that it appears safe and desirable to reduce the lime in the mixture at least to half as much as the amount of copper sulphate. In one trial at Pittsford there was a clear indication that with a 5-1 $\frac{1}{4}$ -50 mixture not so much copper per acre is necessary to give maximum yields as with mixtures containing larger proportions of lime.

**BATES (G. H.) & MARTIN (L. D.). Sulphuric acid spraying of Potato haulm to prevent late infection of the tubers with blight.**—*J. Minist. Agric.*, xlvi, 3, pp. 231-235, 1935.

An account is given of experiments in 1934-5 at King's Lynn, Norfolk, the results of which showed that spraying the potato haulm in the middle of September, when it was still green, with a 10 or 20 per cent. dilution of brown oil of vitriol (containing 77 per cent. of sulphuric acid) rapidly killed the haulm and weeds and did not adversely affect the yield in 'ware' tubers, as compared with control plots, when the crop was lifted three weeks after the application. Examination of the stored potatoes 17 weeks after harvest showed that the percentage of tubers attacked by late blight (*Phytophthora infestans*) [*R.A.M.*, xiv, p. 527] was reduced from 3.9 in the control tubers to 0.66 and 0.49 in the tubers from the sprayed plots, respectively.

The costings of the experiments indicated that the treatment was financially justified even in a season when the incidence of late blight was slight, apart from the considerable advantages resulting from the destruction of the potato haulm and field weeds before harvest.

**MACDOWALL (R. K.). Potato blight. A new method of control by chemical spraying.**—*Scot. J. Agric.*, xviii, 3, pp. 243-249, 1 pl., 1935.

A detailed account is given of the method of control of potato blight (*Phytophthora infestans*) by destroying the haulms with a sulphuric acid spray [see preceding abstract].

HORI (M.). **On the relation between cell contents and the infection in *Phytophthora infestans*.**—*Ann. phytopath. Soc. Japan*, v, 1, pp. 10-22, 1935. [Japanese, with English summary.]

A study of the influence of plant excretions upon infection by *Phytophthora infestans* showed that when water was laid on the surface of the leaves of various plants (all those examined except young tobacco leaves) the zoospores were liberated by the sporangia, swam about, and finally became uniformly distributed on the surface of the leaves, their arrangement bearing no relation to the position of the stomata or the juncture of two epidermal cells. The zoospores were strongly or weakly attracted by the parenchymatous tissues of certain plants. Of some 80 chemical solutions tested, all the acid substances attracted, and all the alkaline ones repelled, the zoospores, while all the neutral agents were inactive. To penetrate the [epidermal] cell wall the fungus did not require the presence of soluble [attractive] substances in the cell, nor was such penetration affected by the alkalinity or acidity of the medium in which the zoospores were liberated. When inoculated on the under-surface of the stripped epidermis or on the surface of the sub-epidermal tissue of various resistant plants, *P. infestans* easily penetrated into the cells. It is concluded that until infection is established the cell contents have no effect on the behaviour of the fungus.

DA SILVEIRA E AZEVEDO (N. A.). **Sobre a doença da Batatinha no município de Theresópolis.** [On the Potato disease in the municipality of Theresópolis.]—*Rodriguesia*, i, 1, pp. 9-12, 3 pl., 1935.

A serious potato disease in the municipality of Theresópolis, Brazil, characterized by the simultaneous wilting of the tops and a slimy rot of the tubers, was shown by isolations to be caused by *Bacterium solanacearum* [R.A.M., xiii, p. 687]. While this appears to be the first official record of the disease in the locality, evidence indicates that it is of long standing there. Cutting seed tubers before planting is believed to favour infection of the resulting plants, and is therefore deprecated. The disease may be controlled by the use of seed tubers from healthy plants together with disinfection either by mercuric chloride (1 in 1,000) for 1½ hours or with a 2 per cent. formalin solution for 2 hours, while some growers recommend 0.5 per cent. copper sulphate for 10 to 12 hours, followed by immersion in a 5 per cent. milk of lime.

**Annual Report. Pathological Division.**—*Rep. Rubb. Res. Inst. Malaya*, 1934, pp. 95-115, 2 graphs, 1935.

During the period under review the increasing importance of brown root disease of *Hevea* rubber due to *Fomes noxius* became apparent. Particular attention is now being paid in Malaya to the control of this and other root diseases (*F. lignosus*, *Ganoderma pseudoferreum*) [R.A.M., xiii, p. 726], both in those areas where natural covers and rubber seedlings have been allowed to develop and in new plantings previously occupied by old rubber considerably reduced by root infection. The deterrent effect of 'forest conditions' on the spread of root disease is attributed to the loss of vigour of the rhizomorphs owing to their division into many small branches in an endeavour to pass through

the maze of roots present in forest-covered soils. In replanting old rubber all diseased roots in the infected areas should be eradicated completely by systematic digging.

In many tests the superiority of the tar distillate emulsions in the control of mouldy rot (*Ceratostomella fimbriata*) [ibid., xiii, p. 471] was again demonstrated, the best being killgerm and linsocresyl (each 10 per cent. in water), which controlled the disease after 16 and 17 daily applications, respectively.

Young clearings of budded rubber are stated to be frequently attacked by pink disease (*Corticium salmonicolor*) [ibid., xiii, p. 125]; it is recommended that water-miscible fungicides only should be applied to the comparatively delicate immature bark.

The delayed and very prolonged refoliation period in 1934 resulted in widespread infection by *Oidium heveae* [ibid., xiv, p. 331 and above, p. 743]. Very few cases of serious leaf fall occurred, however, and most of these concerned only small areas on poor soil, but mild leaf fall was present practically everywhere. During the season, attempts to dust some 25,000 acres with sulphur were hindered by the inclement weather, and it was not possible to give one treatment every seven days, but, on the whole, the dusting gave 50 per cent. control.

**BISBY (G. R.), TIMONIN (M. I.), & JAMES (N.). *Fungi isolated from soil profiles in Manitoba*.**—*Canad. J. Res.*, xiii, 1, pp. 47-65, 1935.

Continuing their studies of the fungal flora of Manitoba soils [R.A.M., xiii, p. 98], the authors give a briefly annotated list of 56 species of fungi not previously known to occur in these soils, which were isolated with others from 12 profiles of five types of virgin soil in Manitoba. In addition to the routine method of incubating dilution plates aerobically at 25° C., some plates were incubated aerobically at 37° or about 6°, and others anaerobically at about 20°. In a discussion of the more important species isolated in this and in the previous investigation [loc. cit.] it is stated that *Mortierella* spp. have proved to be the most abundant Phycomycetes in the soil profiles examined. Species of *Penicillium* constituted one-half of the isolations from the various horizons, in which species of *Aspergillus* were not found to be common; species of *Trichoderma* were much more frequent than the latter. The plates incubated at 37° showed a striking prevalence of *A.* spp., while those incubated at about 6° developed species of *Cylindrocarpon*, *Mucorales*, *Penicillium*, less frequently *Cladosporium*, and rarely other fungi.

The results of the investigation are considered to indicate clearly the occurrence of a definite fungal flora of the soil, especially when taken in conjunction with the work of Jensen [ibid., x, p. 550] and Ziling [ibid., xii, p. 191], who found the soil flora in Denmark and west Siberia, respectively, very like that in Manitoba, the former also showing the relative infrequency of species of *Aspergillus* in northern areas.

**OGILVIE (L.) & BRIAN (P. W.). *Hot-water treatment for Mint rust*.**—*Gdnrs' Chron.*, xcvi, 2535, p. 65, 2 figs. (1 on p. 64), 1935.

Complete control of *Puccinia menthae* [R.A.M., xiii, p. 668] on two forms of the common forcing mint, *Mentha villosa-nervata*, was recently

obtained at the Long Ashton Research Station by ten minutes' immersion of the runners in water maintained at 112° F. A considerable degree of control was also obtained by watering the plants in the outdoor bed with a tar-oil wash in late autumn or early winter, but this process tended to injure the plants.

**Salmon (E. S.) & Ware (W. M.). The downy mildew of the Hop in 1934.**—*J. S.-E. agric. Coll.*, Wye, xxxvi, pp. 48-54, 1935.

In this account of the hop downy mildew [*Pseudoperonospora humuli*; *R.A.M.*, xiii, p. 802] situation in England in 1934 the authors state that even during the drought in July runners were found with leaves bearing the conidiophores and spores of the fungus. However much suppressed by drought, the disease is seldom extinct on an infected plant. During the same period a few spikes capable of producing viable spores probably remained unobserved in most gardens, and accounted for damage to the burr and cones following rain in two districts.

**New disease of the Hop.**—*Fruit-Grower, Lond.*, lxxx, 2064, p. 15, 1935.

According to C. Savidge, County Horticultural Superintendent for Herefordshire, a serious outbreak of hop bine wilt has occurred in that county, the causal organism being identified by L. Ogilvie, of the Long Ashton Research Station, as *Sclerotinia sclerotiorum*, apparently not hitherto recorded as a parasite of this host in England or elsewhere. The attack of the fungus, which was fairly prevalent on lettuces [*R.A.M.*, xii, pp. 421, 485, 780] in the south-west area in 1934, is thought to have probably gained access to the plants through injuries sustained at the time of the mid-May (1935) frost.

**Smith (F. E. V.). Rust disease of Pimento.**—*J. Jamaica agric. Soc.*, xxxix, 6-7, pp. 408-411, 1935.

Pimento [*Pimenta officinalis*] rust [*R.A.M.*, xiv, p. 656], first reported in the spring of 1934, was recorded early in 1935 from every parish in Jamaica except Portland. The causal organism, identified by Miss Wakefield as *Puccinia psidii*, is a common parasite of the rose apple [*Eugenia malaccensis*], and as this host was observed for several years to be severely affected in close proximity to healthy pimento, the pimento strain is almost certainly a very recent mutation of the other.

The disease attacks only the young tissues, causing early defoliation, death of the young twigs, and shedding of the flowers and young berries, with consequent reduction of yield; it has not so far proved fatal.

Spraying is considered impracticable because of the wide area affected, the necessity of making frequent applications to protect the young growth, and the fact that nearly all the trees are wild, none growing under plantation conditions where direct methods of control are economically advantageous. Though the damage already caused, especially in some districts, has been very severe, it is thought that the losses sustained will not be so serious with the return of normal weather.

HANSFORD (C. G.). **Sugar-Cane diseases in Uganda.**—*E. Afr. agric. J.*, i, 1, pp. 25-28, 1935.

A brief, popular account is given of the local history, symptoms, and control of sugar-cane mosaic [*R.A.M.*, xii, p. 422] and red stripe disease (*Bacterium rubrilineans*) [*ibid.*, xiii, pp. 324, 686; xiv, p. 56] in Uganda, where the former is no longer economically important owing to the use of the resistant P.O.J. 2725 and 2878 canes. Red stripe is thought to have spread from some local grass, probably *Pennisetum purpureum*. The paper concludes with short notes on top rot [*ibid.*, viii, p. 337], root diseases (which are almost non-existent in Uganda at present), and leaf spots (*Cercospora* and *Helminthosporium* spp.).

PETRAK (F.) & SYDOW (H.). **Kritisch-systematische Originaluntersuchungen über Pyrenomyzeten, Sphaeropsideen und Melanconieen.** [Original critical and systematic studies on Pyrenomycetes, Sphaeropsidaceae, and Melanconiaceae.]—*Ann. Mycol., Berl.*, xxxiii, 3-4, pp. 157-193, 1935.

The results of the authors' re-examination of a number of Spegazzini's genera and species of fungi are given [cf. *R.A.M.*, v, p. 331]. The type species of *Ephelidium*, *E. aurantiorum*, is stated by Spegazzini in *An. cient. argent.*, xl, p. 84, 1920, to be an imperfect stage of *Amylirosa aurantiorum* [*R.A.M.*, xiii, p. 437], other phases in the life-cycle of which are represented by *Pseudhaplosporella aurantiorum* and *Paradiplodia aurantiorum* [*ibid.*, i, p. 350]. The identity of the two last-named with *Botryodiplodia lecanidion* (Speg.) Pet. & Syd. has been demonstrated in earlier researches by the writers. A critical inspection of Spegazzini's original material of *E. aurantiorum* (No. 1027 in his herbarium, collected in October, 1919) has convinced the authors that the fungus is a parasite of the *Botryodiplodia* stroma, entirely unconnected with its life-history. The genus should be cancelled owing to the anomalous nature of its diagnosis, part of which refers to the stroma of the fungal host.

The type species of Spegazzini's genus *Asbolisia* [*ibid.*, iii, p. 211], *A. (Chaetophoma) ampullula* (*Physis*, *B. Aires*, iv, p. 293, 1918), has been found to be a parasite of *Meliola dubia* Speg. and is referred to the genus *Cicinnobella* as *C. ampullula* (Speg.) Pet. & Syd.

SYDOW (H.). **Beschreibungen neuer südafrikanischer Pilze VI.** [Descriptions of new South African fungi VI.]—*Ann. mycol., Berl.*, xxxiii, 3-4, pp. 230-237, 1935.

An annotated list, supplemented by Latin diagnoses, is given of 19 new species of smuts, Ascomycetes, and Fungi Imperfecti collected in South Africa, of which the following (all from Pretoria) may be mentioned. *Entyloma zinniae* n.sp. forms on the leaves of *Zinnia pauciflora* yellow, later brown, circular to irregular spots, 2 to 5 mm. in diameter; it is characterized by globular or subglobular spores, 8 to 12 or up to 13  $\mu$  in diameter, with a yellowish- or light-brown episporule, 1.5 to 2  $\mu$  in thickness. *Phyllactinia acaciae* n.sp., occurring on both leaf surfaces of *Acacia robusta*, has cylindrical conidia, often with a median constriction, obtusely rounded at both ends, 50 to 70 by 12 to

16  $\mu$ ; perithecia 120 to 210  $\mu$  in diameter with 6 to 10 hyaline appendages, 70 to 120 by 25 to 35  $\mu$ , conspicuously swollen at the base; and 5 to 10 ovate or subglobose asci, 45 to 60 by 20 to 30  $\mu$ , containing 2 to 3 spores, 22 to 30 by 12 to 14  $\mu$ . The pseudosclerotia of *Balansia cynodontis* n.sp. are formed singly on the haulm nodes, mostly between two leaves, of *Cynodon dactylon*; they are erumpent, straight or curved, corniform, 0.5 to 1 cm. in length, with an irregularly bulbous swelling at the base, 2 to 3 mm. in thickness, tapering towards the apex. The stroma covering the upper side of the sclerotia is of variable extent; the densely crowded, oblong to lageniform perithecia measure 175 to 200 by 70 to 90  $\mu$  and are furnished with a papillate ostiole and dark-coloured walls, 8 to 15  $\mu$  thick; the elongated-cylindrical asci, 110 to 130 by 5.5 to 6  $\mu$ , are provided with an apical membranous sheath and contain 8 filiform, hyaline spores, about 1  $\mu$  in diameter.

MAINS (E. B.). **Michigan fungi. I.**—*Pap. Mich. Acad. Sci.*, xx, pp. 81-93, 5 pl., 1935.

Among the species included in this annotated list of 63 Michigan fungi are *Keithia* [*Didymascella*] *thujina* [R.A.M., xi, pp. 22, 96], causing considerable defoliation of *Thuja occidentalis* in the upper Peninsula in 1933, and *Uromyces flectens*, the short-cycled rust correlated with the common long-cycled species *U. trifolii*, on white clover (*Trifolium repens*) [ibid., xiv, p. 241]. During 1931-2 repeated inoculations with *U. flectens* on white clover yielded only teleutospores, indicating that the species is distinct from *U. trifolii*. Lagerheim's description (*Svensk bot. Tidskr.*, iii, p. 36, 1909) unquestionably refers to the short-cycled rust, so that the retention of his name of *U. flectens* is advisable.

PGVAH (A. H. W.). **The fungi of Isle Royale, Lake Superior.**—*Pap. Mich. Acad. Sci.*, xx, pp. 113-156, 4 pl., 1935.

The following are among the records of special interest in this annotated list of 525 fungi (of which 185 are believed to be new for the State) collected on Isle Royale, Lake Superior, Michigan, in 1930. 'Bluebottle' flies on grass tips were found to be parasitized by *Entomophthora bullata* Thaxter, sp. nov. ined. with very characteristic subglobose, bullate zygospores, 33 to 50  $\mu$  in diameter. The writer was informed by Thaxter that the conidia of *E. bullata* are indistinguishable from those of *E. americana* [R.A.M., viii, p. 720]. Birches (*Betula alba* var. *papyrifera*) were severely attacked by *Nectria galligena* [ibid., xiii, p. 732], producing large black cankers, which also occurred in epidemic form on *Populus tremuloides*, causing a mortality of some 30 per cent. Witches' brooms due to infection by *Peridermium coloradense* [ibid., ix, p. 420] were observed on *Picea mariana* and *P. canadensis*.

BOSE (S. R.). **The distribution of some Polypores at our high altitudes.**—*Ann. mycol.*, Berl., xxxiii, 3-4, p. 201, 1935.

The following Polyporaceae, collected from the Lokra Hills, Assam (Bengal), at an altitude of 8,000 to 10,000 ft. above sea-level, are stated never to have been found in the Bengal plains, though common in north temperate regions: *Polyporus squamosus* [R.A.M., xiii, p. 532],

*P. sulphureus* [ibid., xiv, p. 62], *P. gilvus* [ibid., xi, p. 275] f. *licnoides*, *Fomes fomentarius* [ibid., xiv, p. 62], and *F. pinicola* [ibid., xiii, p. 604]. The absence of these fungi from the Bengal plains is attributed primarily to lack of natural hosts, climatic factors being of secondary importance [ibid., xii, p. 579].

OVERHOLTS (L. O.). **The Polyporaceae of Pennsylvania. II. The genera Cyclomyces, Daedalea, Favolus, Fomes, Lenzites, and Trametes.**—*Bull. Pa agr. Exp. Sta.* 316, 16 pp., 2 pl., 1935.

In this, the second paper of this series [R.A.M., xiii, p. 270], the author gives keys to the species of the genera *Cyclomyces*, *Daedalea*, *Favolus*, *Fomes* (which is divided into two sections, namely, *Leuco-* and *Fusco-Fomes*), *Lenzites*, and *Trametes*, which occur in Pennsylvania. Each key is followed by a resumé of the main characters of the species covered by it. The fungus previously referred by American authors to *T. protracta* or *T. odorata*, and by some regarded as a form of *L. sepiaria*, is described as a new species and named *T. americana* [with a diagnosis in English only]. It occurs on dead wood of coniferous trees and on structural timbers. Three new combinations are made, including *Fomes subroseus* [= *Trametes subroseus* Weir] and *F. robustus* var. *tsugina* (= *Fomitiporia tsugina* Murrill).

TAI (F. L.). **Notes on Chinese fungi. V.**—*Bull. Chin. bot. Soc.*, i, 1, pp. 11-35, 11 figs., 1935.

Continuing his studies on Chinese Erysiphaceae [R.A.M., xii, p. 661], the writer gives critical and taxonomic notes on the 44 species (two of them new) and 4 varieties so far recorded for the country. *Microsphaera dentatae* Liou on *Quercus dentata* is renamed *M. alni* var. *dentatae* as it differs from the type only in the open, irregular branches of the perithecial appendages.

A key to the genera and species of Chinese Erysiphaceae and a host index are appended.

MATSUMOTO (T.) & YAMAMOTO (W.). **Hypochnus sasakii Shirai in comparison with Corticium stevensii Burt and Corticium koleroga (Cooke) v. Höhn.**—*Trans. nat. Hist. Soc. Formosa*, xxv, pp. 161-175, 2 figs., 1935.

The writers tabulate and discuss the cultural, morphological, and pathogenic differences between *Corticium sasakii* from rice, *C. stevensii* isolated from pear twigs sent by G. F. Weber from the United States and *C. koleroga* isolated by Narasimhan from coffee in India [R.A.M., xiii, pp. 540, 804; xiv, p. 627]. Among the more important distinguishing features may be mentioned the sclerotial shape, colour, and dimensions in the three species. In *C. sasakii* these organs are subglobose or slightly flattened, sayal- to Verona-brown, 16 to 68 by 7 to 26  $\mu$ , mostly 26 to 42 by 11 to 20  $\mu$ , with fairly thick, brown walls; in *C. stevensii* somewhat flattened, mikado-brown to bistre, 10 to 52 by 4 to 9  $\mu$ , mostly 13 to 26 by 6 to 7  $\mu$ , with paler and thinner walls than the foregoing; and in *C. koleroga* subglobose, 16 to 55 by 7 to 17  $\mu$ , mostly 23 to 36 by 10 to 13  $\mu$ , with pale, thin walls. The last-named species, unlike the other two, does not form sclerotia in pure culture. Hyphal fusions were observed

to take place in homologous strains but in no case between the three species studied. Inoculation experiments made on *Codiaeum variegatum*, Japanese pear (*Pyrus serotina*), coffee, and *Gardenia angusta* var. *ovalifolia* showed that all these hosts except the first-named were infected by each of the three *Corticium* species, though differences in their virulence were apparent.

ASUYAMA (H.). *The life-cycle of heteroecious species of Puccinia.*

**I. Puccinia culmicola** Diet. and **P. zoysiae** Diet.—*Ann. phytopath. Soc. Japan*, v, 1, pp. 23–29, 3 figs., 1935. [Japanese, with English summary.]

In inoculation experiments on wheat, aecidiospores of *Aecidium berberidis-thunbergii* taken from *Berberis thunbergii* var. *maximowiczii* growing in three localities failed to produce infection, but when barberry was inoculated with teleutospores of *Puccinia culmicola* obtained from *Agropyron semicostatum* abundant pycnidia (which when mature smelt of fish or glue) developed within two weeks, followed three weeks later by aecidia. Inoculations on the leaves of *Agropyron* and rye with these aecidia produced uredosori identical with those of *P. culmicola*. For this reason, and because of their morphological resemblances, *P. culmicola* is considered to be a form of *P. graminis*.

Teleutosori of *P. zoysiae* from *Zoysia japonica* sown on *Paederia chinensis* resulted in the production of aecidia identical with *Aecidium paederae* in 24 days.

BLOCHWITZ (A.). *Die Gattung Aspergillus. IV. Neue Arten. Synonyme.*

**Varianten und Mutanten.** [The genus *Aspergillus*. IV. New species. Synonyms. Variants and mutants.]—*Ann. mycol., Berl.*, xxxiii, 3–4, pp. 238–250, 1935.

Continuing his critical studies on the genus *Aspergillus* [R.A.M., xii, p. 396], the writer describes one new species, *A. hennebergi* [without a Latin diagnosis] and discusses the synonymy of a number of others. In connexion with observations on a series of variants and mutants, Mosséray's reclassification of the *A. niger* group [ibid., xiv, p. 334] is criticized and shown to be based on a very insecure foundation. Many of the species or varieties into which the group is arbitrarily subdivided are considered to be merely anomalies of growth resulting from unfavourable cultural conditions, bacterial contamination, or other external factors.

MUSKETT (A. E.), CAIRNS (H.), & CARROTHERS (E. N.). *Further contributions to the fungus flora of Ulster.*—*Proc. R. Irish Acad., Sect. B*, xlvi, 4, pp. 41–54, 1934. [Received October, 1935.]

This continuation of the authors' previous annotated list of Ulster fungi [R.A.M., xi, p. 746] comprises 275 species and 9 varieties, making a total for the Province of 1,199.

Since the detection of *Corticium anceps* in a parasitic form on bracken (*Pteris aquilina*) [*Pteridium aquilinum*: R.A.M., xii, p. 815 and next abstract] in 1931, no evidence is forthcoming of any appreciable decline in the growth of the fern as a result of the activity of the fungus.

GREGOR (MARY J. F.). **A disease of Bracken and other ferns caused by *Corticium anceps* (Bres. et Syd.) Gregor.**—*Phytopath. Z.*, viii, 4, pp. 401-418, 11 figs., 1935.

*Corticium anceps* [see preceding abstract], which in nature has been found only on bracken (*Pteridium aquilinum*) and *Aspidium filix-mas*, was inoculated under controlled conditions into *A. spinulosum*, *A. aculeatum* var. *lobatum*, *Asplenium trichomanes*, *Polypodium vulgare*, *Blechnum spicant*, *Cystopteris fragilis*, and *Scolopendrium vulgare* with positive results.

The mycelium, composed of hyphae 3 to 7  $\mu$  in diameter, penetrates the host tissue by means of hyaline, convexo-discoidal infection cushions, 0.07 to 0.3 mm. in diameter, and 0.04 to 0.07 mm. in thickness, and also through the stomata. Basidia are formed superficially and constitute a white, felt-like coating on the under side of the fronds; under appropriate conditions the oval basidiospores, arising from large sterigmata, germinate on the hymenium, either by means of secondary spores on short promycelia [cf. *R.A.M.*, xii, p. 777] or more frequently directly by a germ-tube up to 85  $\mu$  in length. The fungus is readily cultivable on various nutrient media, on which numerous sclerotia but no basidia are formed.

The bracken disease [the symptoms of which are fully described] is stated to have been reported from Mecklenburg, Germany, as well as from Scotland and Northern Ireland. It is markedly affected by climatic conditions, having been very prevalent in Scotland in the wet summer of 1931, since when the drier weather has prevented severe outbreaks. Infection by *C. anceps* occurs almost exclusively on the fronds of bracken, never extending more than a few inches down the petiole and in no case involving the rhizomes. A *Corticium* fairly often observed at the base of the petioles at soil level appears to be quite harmless to the plants.

SMITH (K. M.) & BALD (J. G.). **A description of a necrotic virus disease affecting Tobacco and other plants.**—*Parasitology*, xxvii, 2, pp. 231-245, 2 pl., 2 graphs, 1935.

An account is given of an apparently hitherto undescribed virus disease which has been frequently observed on seedlings of White Burley, Virginia, and Vermont tobacco, and of *Nicotiana glutinosa* in the glasshouses of the Potato Virus Research Station at Cambridge; the same or a similar disease was also observed at the Waite Institute in South Australia during the years 1931-33. In tobacco seedlings at the two-leaf stage the disease caused a necrosis which spread from the base of the stem along the midrib, often killing the seedling within two or three days. In older, naturally infected seedlings the base of the stem was sometimes constricted by a ring of necrotic tissue, the necrosis occasionally extending up the midrib of the lowest leaf which was killed; this might occur in succession with several leaves, or the plant might eventually recover with no other symptom than a slight retardation of growth. In affected leaves the veins appeared sunken, the leaf curled over, and sometimes whitish etched lines appeared on either side of the veins. A characteristic of the disease was the restriction of the

symptoms to a few leaves, the virus never becoming wholly systemic in tobacco. Necrotic and yellow, rarely concentric rings developed, which on the older leaves often attained several centimetres in diameter and were comparatively faint and irregular in outline. Inoculation of healthy tobacco plants produced usually circular, necrotic lesions on the inoculated leaves, often in considerable numbers; sometimes the lesions were surrounded later by single necrotic rings, and occasionally the necrosis spread subsequently along the midrib and veins of one or two of the older leaves.

On *N. glutinosa* the virus produced on the inoculated leaves lesions which rapidly dried out and became white. Natural infections resulted in symptoms similar to those on tobacco, but the spread of the virus was even more restricted. Local symptoms were produced by inoculation on *Datura stramonium* and tomato, but except for two plants of the former the necrosis did not spread farther. Attempts to infect the potato gave negative results. Cowpea (*Vigna sinensis*), on the other hand, proved to be very susceptible to infection (by spraying the leaves with a suspension of the virus), but the virus very rarely spread beyond the inoculated leaf.

While a special series of experiments showed that in tobacco plants the virus is not present in tissues outside the lesions, it was occasionally found in the roots of young plants, usually in the case of natural infections. Its dilution end-point appeared to be 1 in 10,000; its longevity in extracted sap is about 20 days, and its thermal death-point is 72° C. So far as tested, the virus remained viable for 71 hours in 99 per cent. alcohol. Its particle size was found by the ultra-filtration method to be 20 to 30  $\mu$ p.

Owing to the necrotic symptoms caused by the virus, the descriptive name 'tobacco necrosis' is suggested for the disease, but if the numerical system of nomenclature advocated by James Johnson is followed, the virus itself should be called 'tobacco virus 10'.

CHESTER (K. S.). **A serological estimate of the absolute concentration of Tobacco mosaic virus.**—*Science*, N.S., lxxii, 2114, p. 17, 1935.

Assuming that the molecular weight of the tobacco mosaic virus [see above, p. 782, and next abstract] is 100,000 [*R.A.M.*, xiv, p. 115] and that the concentration of virus particles [*ibid.*, xii, p. 528] is  $3 \times 10^7$  per c.c., the concentration of the tobacco mosaic virus is 1 mg. in 200,000 l. of sap. If the tobacco mosaic virus is no more antigenic than the *Pneumococcus* carbohydrate (the most highly antigenic substance known, with a minimal precipitating concentration of 0.0004 mg. per c.c.), then 1 c.c. of tobacco mosaic sap (which gives a precipitin titre of 1: 250) contains at least 0.1 mg. of virus ( $0.0004 \times 250$ ). Or if compared with egg albumin, which has a precipitin titre of 1: 250,000 (0.004 mg. per c.c.), tobacco mosaic sap contains no less than 0.1 to 1.0 mg. per c.c.

Tobacco mosaic sap diluted to 1: 1,000,000 gives approximately one lesion per leaf on *Nicotiana glutinosa*, and about 0.1 c.c. of diluted sap is used in making the inoculation. From these facts and assuming the molecular weight of the virus to be 100,000, it follows that 1 c.c. of virus sap contains  $6.06 \times 10^{14}$  to  $6.06 \times 10^{15}$  molecules of virus and that a single minimal infective dose on *N. glutinosa* corresponds to 60 to

600 million virus molecules. The fact that only a single infection results from inoculation with such enormous numbers may be due either to the scarcity of places suitable for infection, e.g., the protoplasm exposed in the breaking of a leaf hair, or to the aggregation of virus particles.

**LIVINGSTON (L. G.) & DUGGAR (B. M.). Experimental procedures in a study of the location and concentration within the host cell of the virus of Tobacco mosaic.**—*Biol. Bull. Wood's Hole*, lxvii, 3, pp. 504-512, 1934.

Using a Chambers's micro-manipulation apparatus with a Spencer microscope giving a magnification of approximately  $\times 260$ , the writers carried out at Wisconsin University detailed cytological studies on the hair cells in sections (mounted in 20 per cent. glycerine) of mosaic-infected tobacco plants [see preceding abstract] to determine the location and concentration of the virus in the different parts. The infective principle was found to occur primarily, if not exclusively, in the protoplasmic contents of the cell, rather than in the vacuole. Evidence was obtained that the inclusion bodies occurring in the hair cells are products evolved by the agent; both the vacuolate and striated or so-called 'crystalline' types are fragile structures disintegrating on contact with the micro-needle or pipette and entering the smallest apertures.

**RAMSEY (G. B.). Pleospora rot of Tomatoes.**—*J. agric. Res.*, li, 1, pp. 35-43, 2 pl., 1935.

This is a full account of the author's studies of the tomato fruit rot caused in the United States by *Pleospora lycopersici*, a preliminary report of which has been noticed from another source [R.A.M., xiii, p. 548]. In addition to the information already given it is stated that in the course of the last three years the trouble has become increasingly important in tomatoes shipped from California during November and December, and in Mexican shipments in January, losses as high as 50 to 90 per cent. having been reported in some carloads. Inoculation experiments showed that in both mature-green and ripe tomatoes little or no decay developed at temperatures below 45° or above 80° F., the optimum temperature being from 65° to 70°, but at all the temperatures tested the decay progressed more rapidly in ripe than in mature-green fruits. In cultures on potato-dextrose agar ( $P_h$  4.7 and 6.01) the temperature relations of the fungus were: minimum 35°, optimum 70°, and maximum 90°. The optimum temperature for the development of the conidial stage, *Macrosporium sarcinaeforme*, was about 75°, and cultures with a tendency to produce this stage grew more rapidly than those in which the perithecial stage was dominant. At all the temperatures at which the fungus made appreciable growth, the growth rate was more rapid on agar having a  $P_h$  value of 6.01 (the average acidity of the ripe tomatoes) than at  $P_h$  4.7 (the average acidity of the mature-green fruit).

**MCLEAN (A. P. D.). The bunchy-top disease of the Tomato. Host range of the bunchy-top virus.**—*Fmg S. Afr.*, x, 112, pp. 302-303, 4 figs., 1935.

A popular note is given on bunchy top of tomatoes in South Africa

[*R.A.M.*, xiii, p. 131], with special reference to the host range of the virus. This has been transmitted to *Solanum aculeatissimum*, *S. aculeastrum*, *S. duplosinuatum*, *S. incanum*, *S. panduraiforme*, *S. nigrum*, *S. sodomaeum*, *Nicandra physaloides*, *Physalis angulata*, *P. viscosa*, tobacco, eggplant, Cape gooseberry [*P. peruviana*], petunia, pepper [*Capsicum annum*], and potato; in *P. angulata* and *S. nigrum* the symptoms of bunchy top are completely masked. The eradication of these Solanaceous weeds from the vicinity of tomato fields is therefore very important, though in the eastern Transvaal, where the crop is grown practically all the year round, diseased plants in the older fields probably constitute an important source of primary infection.

STOUT (G. J.). **Influence of watering treatment on the occurrence of blossom-end rot in greenhouse Tomatoes.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 515-518, 1935.

The results of an experiment conducted in 1932 in Pennsylvania to determine the influence of the time and amount of watering on blossom-end rot of Marhio tomatoes [*R.A.M.*, xiii, pp. 547, 663] indicated that heavy, infrequent applications (11 in six months) are more conducive to freedom from this disease than light, regular waterings (almost daily). However, since a certain amount of blossom-end rot occurred on all the plots, the ideal watering schedule probably lies between the two extremes tested.

GOIDANICH (G.). **Ueber die wahre Ursache des Burbanksterbens in Italien.** [On the true cause of the dying-off of Burbank Plums in Italy.]—*Z. PflKrankh.*, xlv, 6-7, pp. 335-340, 7 figs., 1935.

In view of the fact that widespread credence has been given to the report emanating from Dr. L. Franceschi and promulgated by Dr. Reinboth in *Z. PflKrankh.*, xlv, pp. 143-146, 1935 [which paper was not noticed in this *Review*] of the implication of *Graphium* [*Ceratostomella*] *drui* in the extensive dying-off of Burbank plums now proceeding in Italy [*R.A.M.*, xiv, p. 374], the writer recapitulates his evidence for regarding the disorder as a non-parasitic leptonecrosis [*ibid.*, xiv, p. 454].

AUGHANBUGH (J. E.). **Replacement of the Chestnut in Pennsylvania.**—*Bull. Pa Dep. For. Waters* 54, 38 pp., 1935. [Abs. in *J. For.*, xxxiii, 9, pp. 825-826, 1935.]

This is a review by A. G. Hall of a bulletin stated to cover an immense amount of detailed work accomplished by the author during the last five years on the economic, biological, and silvicultural problems created in south-eastern Pennsylvania by the death of the chestnut from blight (*Endothia parasitica*) [*R.A.M.*, xiv, p. 726].

Some 3,000 study plots were established in 1930 in regions where the chestnut formerly abounded—the Mont Alto and Michaux State Forests. Treating the blight damage as an excessively heavy thinning, the author found a decided growth acceleration among the chestnut's former associates largely consisting of relatively undesirable species, such as rock oak [? *Quercus prinus*] and red maple [*Acer rubrum*]. The removal of chestnut competition increased by 80 per cent. the

diameter growth of the remaining trees. In stands where chestnut comprised the bulk of the stumps the growing stock had been so heavily depleted that a 5 to 35 per cent. deficiency still exists, but in stands with less than 10 per cent. chestnut the volume is greater than before the attack. The quality of the stands might be improved by judicious felling, intensive fire protection, and supplemental planting of desirable types of oak and pine. That the chestnut maintains a tenacious hold on existence is shown by the recurrent sprouting from old stumps and the establishment of new seedlings, each fresh batch of shoots being apparently more resistant than the last [ibid., xii, p. 355].

**RICCARDO (S.). Contributo sperimentale per lo studio delle alterazioni interne delle Castagne.** [An experimental contribution to the study of internal spoilage of Chestnuts.]—*Ric. Osserv. Divulg. fitopat. Campania ed Mezzogiorno (Portici)*, iv, pp. 12-17, 1935.

As chestnuts treated before exportation from Italy with hot or cold water for the destruction of insect larvae sometimes show mould infection [R.A.M., xiii, p. 65 and next abstract] upon arrival in America, the author carried out a series of tests to ascertain the effect of the treatment on fungal and bacterial invasion. The results obtained showed that both the hot and cold water treatments facilitate the entrance of micro-organisms into the chestnuts, that the thick silky covering on the inner surface of the pericarp offers considerable resistance to further penetration, and that the parts most liable to allow infection are the top of the chestnut and the basal scar. Immersion of treated chestnuts in an aqueous carmine solution showed that the dye penetrated in a manner similar to that of the micro-organisms.

**TROTTER (A.). Per la prevenzione contro l'ammuffimento delle Castagne.** [For the prevention of Chestnut moulds.]—*Ric. Osserv. Divulg. fitopat. Campania ed Mezzogiorno (Portici)*, iv, pp. 67-69, 1935.

After referring to the frequency of mould infection (*Rhacodiella*, *Penicillium*, *Trichothecium*, *Mucor* spp., etc.), and bacterial rots on chestnuts exported from Italy [see preceding abstract] the author gives brief directions for the control of these organisms by improved methods of orchard practice, harvesting, and storage, the removal of affected chestnuts throughout the various operations, and the planting, in the new groves, of resistant strains.

**HAMOND (JOYCE B.). The morphology, physiology, and mode of parasitism of a species of Chalaropsis infecting nursery Walnut trees.—**  
*J. Pomol.*, xiii, 2, pp. 81-107, 4 pl., 1935.

This is a full account of the author's comparative studies of the strains of *Chalaropsis thielavioides* from diseased walnut grafts and roots, carrots, and peach seedlings, the more important results of which have been noticed from another source [R.A.M., xiv, pp. 408, 726].

**VARADARAJA IYENGAR (A. V.). Biochemistry of the spike disease of Vinca rosea Linn.—***J. Indian Inst. Sci.*, xviiiA, 9, pp. 61-67, 1935.

As in the case of sandal [*Santalum album*] spike, in spiked *Vinca rosea* [R.A.M., viii, p. 146; xiv, p. 539] the total ash and calcium

contents of the stem and leaf tissues are reduced and the nitrogen content increased as a result of the disease, in striking contrast to the depletion of nitrogen and increase of calcium which occur in affected roots. The protein content of diseased plants is generally lower than that of healthy ones, the reverse being observed in the case of ammonia. As in sandal spike, the calcium-nitrogen ratio in the diseased stems and foliage of *V. rosea* is distinctly lower than in healthy ones. Diseased stems and roots contain more starch and the leaves more starch and sugar than corresponding healthy specimens, but diastatic activity in the former is greater than in the latter. Similar observations in respect of starch and sugar contents and diastatic activity were made in spiked and healthy plants of *Zizyphus oenoplia*.

RANGASWAMI (S.) & SREENIVASAYA (M.). **Insect transmission of spike disease of Sandal (Santalum album Linn.).**—*Curr. Sci.*, iv, 1, pp. 17-19, 1-35.

Continuing their studies on the spike disease of sandal (*Santalum album*) [R.A.M., xiv, p. 265], the authors give an account of two experiments carried out in 1934 (one in the midst of a heavily spiked area at Jawlagiri, and the other at Denkanikota, where the disease is only one-fifth as virulent), in which healthy sandal trees were put in insect-proof cages together with spiked ones, and insects, collected during the night, belonging to 252 and 190 different species, respectively, of the local sandal forest fauna, were released in the cages. By the end of April, 1935, 16 of the 37 healthy trees in the Jawlagiri cage became spiked, while no spread was noticed in the Denkanikota cage, although later one plant developed symptoms of the disease. The high percentage (43.2) of transmissions at Jawlagiri is considered to show conclusively that the disease is insect-borne, and also indicated that the insect vectors are active during the night. Suspicion falls on three types of Pentatomidae, two of Jassidae, and three of Fulgoridae, and experiments to determine the part played by them in the transmission of the disease are now in progress.

DARKER (G. D.). ***Hypodermella hiratsukae*, a new species of Hypodermellaceae from Japan.**—*J. Arnold Arbor.*, xvi, 3, pp. 364-365, 1 pl., 1935.

Latin and English diagnoses are given of *Hypodermella hiratsukae* sp. nov., collected by N. Hiratsuka on the leaves of *Pinus pumila* in Ishikari Province, Japan, in August, 1927.

The shining black, oblong or elliptical hysterothecia of *H. hiratsukae* measure 0.54 to 1.30 by 0.26 to 0.34 mm. and open by a longitudinal fissure, the basal layer being colourless, plectenchymatous, 20 to 35  $\mu$  thick, the covering layer of dark pseudoparenchyma 28 to 34  $\mu$ , and the hymenium 100 to 110  $\mu$ . The broad, somewhat fusiform asci, truncate to rounded at the tip, measure 87 to 102 by 18 to 24  $\mu$  and are occupied by eight clavate-fusiform, hyaline ascospores, tapering towards the base, 36 to 56 by 3.5 to 5  $\mu$ , surrounded by a conspicuous gelatinous sheath up to 8  $\mu$  thick; the simple, filiform, membranaceous paraphyses measure 100 to 110 by 1  $\mu$ . The new species most closely resembles *H. larici*, the type species of the genus [R.A.M., xii, p. 255], but the

pycnidia and pycnospores so profusely formed by the latter are not known to occur in *H. hiratsukae*.

LAGERBERG (T.). **Barrträdens vattved.** [Wet wood of conifers.]—  
*Svenska SkogsvFören. Tidskr.*, xxxiii, 2, pp. 177–264, 1 pl., 32  
figs., 1935. [English summary.]

A characteristic defect of Swedish conifer (pine and spruce) wood is fully described from the morphological, anatomical, silvicultural, and economic standpoints, the mycological aspects of the trouble, known as 'wet wood' and stated to be on the increase, being less exhaustively treated. The present account is based on observations made in 1933 in the affected stands of southern Lapland, supplemented by extensive laboratory studies. In Sweden the disturbance has been found to occur only from upper Dalecarlia northwards; it has been reported also from Norway and northern Finland, where it has, however, attracted little attention.

Two types of wet wood are differentiated, one directly associated with dead branches in the upper part of the trunk and mainly affecting trees upwards of 170 years old, and the other connected with dead roots, occurring below breast-height in younger trees (from 100 years). In the first type the rot assumes the form of streaky infiltrations in the heartwood, which in the second becomes partially or wholly saturated with moisture.

The depreciation in log grading due to wet wood alone was conservatively estimated at 14·6 per cent. The timber also requires a much longer period of seasoning than sound material, and is liable to severe cracking during this process.

Wet wood is not considered to be a true rot. In the branch-borne form of the disease the material has repeatedly been found perfectly sterile, while the Dematiaceae and other fungi associated with wet wood of the roots are obviously soil occupants which penetrate through the cracks and produce a blue-black stain known to lumbermen as 'dark wet wood'. Such changes, however, render the trees accessible to true wood-rotting fungi, mostly confined to the butts and readily removable during logging operations. Cultural studies have shown that *Poria vaporaria*, *Polyporus borealis* [R.A.M., xiii, p. 738], and *P. schweinitzii* are present, but the only organism developing fruiting bodies on transfer to wood is a *Coniophora* closely agreeing with *C. fusispora* (Cooke & Ell.) Cooke described from North America.

DAY (W. R.) & PEACE (T. R.). **Butt rot of conifers.**—*Forestry*, ix, 1,  
pp. 60–61, 1935.

The authors state that preliminary investigations have established that *Fomes annosus* [R.A.M., xiv, p. 663] is the fungus most commonly found associated with butt rot in conifer plantations in Great Britain, other records including *Stereum sanguinolentum* [ibid., xiv, p. 728], *Polyporus schweinitzii* [ibid., xi, p. 615], *Pholiota squarrosa* [ibid., xiv, p. 677], and *Armillaria mellea* [ibid., xiii, p. 553; xiv, pp. 618, 677]; it is believed, however, that further researches will add considerably to this list. Butt rot occurs on a great variety of soil types, and has been found in serious amounts on soils which superficial examination would

show to be quite suitable for healthy tree growth. So far European larch [*Larix europaea*] appears to be the most commonly affected, and Norway spruce [*Picea excelsa*] to a rather smaller extent, while it appears almost certain that Scots pine [*Pinus sylvestris*] is less susceptible than either of the two first-named species.

NISIKADO (Y.) & YAMAUTI (K.). Contributions to the knowledge of sap stains of wood in Japan. III. Studies on *Ceratostomella piceae* Münch, the cause of a blue stain of Pine trees.—*Ber. Ohara Inst.*, vi, 4, pp. 539–560, 5 pl., 1935.

Continuing their studies on the species of *Ceratostomella* responsible for blue stain of pine trees in Japan [R.A.M., xiv, p. 275], the authors give a full, tabulated account of their work on *C. piceae*, which attacks a large number of woods, including *Pinus thunbergii*, *P. densiflora*, *P. parvifolia*, *Chamaecyparis obtusa* Sieb. & Zucc. [*Thuja occidentalis* L.], *Picea jezoensis*, *P. glehnii*, *Quercus grandifolia* Blume [*Q. spicata*], *Magnolia hypoleuca* Sieb. & Zucc., *Betula japonica* Sieb. [*B. alba* L.], and *Acer pictum* Thunb. Standing as well as felled pines are liable to infection by *C. piceae*, the wedge-shaped, greyish-blue discolouration of the sapwood being generally much lighter than that due to *C. pini* or *C. ips* [ibid., xiv, p. 729]. Reports from Saghalien state that standing spruces may also be attacked by *C. piceae*, but in western Japan the fungus is more prevalent in the timber yards.

Strains of the fungus from pine, birch, and other woods were grown on a number of standard media. The hyphae, 3 to 8, commonly  $5\ \mu$  in diameter, penetrate the parenchyma cells of the medullary rays from the cortex towards the centre, while the resin ducts and tracheids are invaded in a longitudinal and the bordered pits in a tangential direction. *C. piceae* produces three conidial stages [ibid., xiv, pp. 271, 274]: (1) a *Graphium* stage on the surface of the stained sapwood and in culture; (2) a *Cephalosporium* stage, generally formed in culture and sometimes on germ-tubes of ascospores, with elliptical or long elliptical spores with rounded ends; and (3) a *Cladosporium* stage, produced on protuberances at the end of conidial and ascosporal germ-tubes and in culture, with colourless, spindle-shaped, or elliptical spores, straight or rarely curved, with one or both ends pointed, the conidial dimensions of the three types being 3 to 8 by 2 to 4  $\mu$  (mean  $4.82 \pm 0.03$  by  $2.50 \pm 0.03\ \mu$ ), 4 to 12 by 2 to 4  $\mu$  ( $7.17 \pm 0.06$  by  $2.88 \pm 0.02\ \mu$ ), and 4 to 22 by 2 to 4  $\mu$  ( $9.13 \pm 0.10$  by  $2.90 \pm 0.02\ \mu$ ), respectively. On germinating the conidia swell and assume a spherical, elliptical, or long-elliptical shape, the dimensions at this stage being 6 to 15 by  $5\ \mu$ . The flask- to bulb-shaped perithecia are produced profusely on the cut surface of timber; those formed in culture on steamed pine blocks measure 105 to 225 by 105 to 225  $\mu$  ( $157.1 \pm 2.34$  by  $161.2 \pm 2.69\ \mu$ ) and are furnished with straight or slightly curved beaks, dark brown at the base, becoming lighter towards the apex, 650 to 1,950  $\mu$  ( $1,247 \pm 17.06\ \mu$ ) long by 5 to 55  $\mu$  ( $20.3 \pm 0.66\ \mu$ ) at the base and 3 to 18  $\mu$  ( $9.6 \pm 0.05\ \mu$ ) near the tip, where they are fringed with 10 to 15 hyaline cilia, 20 to 30, rarely 40  $\mu$  in length. The spherical or short-elliptical asci, 4.5 to 10.5  $\mu$  in diameter, contain eight hyaline, reniform or long-elliptical, straight or curved ascospores, 2.8 to 4.8 by 0.8 to 2.3  $\mu$  ( $3.7 \pm 0.041$  by  $1.4 \pm 0.026\ \mu$ ),

becoming globular on germination (5 to 8 by 4 to 5  $\mu$ ) and producing one or two germ-tubes, over 6  $\mu$  thick.

The growth-rate of *Ceratostomella piceae* in culture at 25° C. was found to be much slower than that of *C. pini* and *C. ips*. Neither vegetative growth nor conidial germination takes place in the absence of free oxygen. The conidia and ascospores succumbed to 10 minutes' immersion in water at 52° or 15 at 50°, and were also destroyed by one hour's treatment in 1 in 4,000 mercuric chloride or 1 in 200 formalin and uspulun. Growth was inhibited by the incorporation with malt extract agar of mercuric chloride or uspulun at a strength of 1 in 10,000 or copper sulphate at 1 in 5,000.

**BAXTER (D. V.). Some resupinate Polypores from the region of the Great Lakes. VI.**—*Pap. Mich. Acad. Sci.*, xx, pp. 273-281, 6 pl., 1935.

Continuing his studies on the resupinate Polypores of the Great Lakes [R.A.M., xii, p. 543], the writer discusses the pathogenicity, distribution, taxonomy, and hosts of *Poria subacida* [ibid., xi, p. 552] with special reference to its occurrence on white cedar (*Thuja occidentalis*). The type of decay induced on various hosts is a spongy rot, accompanied in the early stages by numerous black spots, which become surrounded by a whitened area and finally disappear. The pale areas expand and the wood surrounding the spots turns straw-coloured. Ultimately the white cavities coalesce and convert the heart-wood into a soft, spongy mass of water-soaked fibres. Features similar to the foregoing characterize the 'feather butt rot' of balsam fir (*Abies balsamea*), reported by McCallum from Canada as probably due to the same organism [ibid., viii, p. 412]. The average loss in weight of white cedar wood from the decay caused by *P. subacida* was estimated in cultural tests as 3.54 per cent. of the oven-dry weight in a year. A list is given of 39 different trees liable to attack by *P. subacida*, including sugar maple (*Acer saccharum*), birch (*Betula alba* var. *papyrifera*, *B. lenta*, and *B. lutea*), chestnut, ash, walnut, larch, *Pinus strobus* and eight other species, plane (*Platanus occidentalis*), *Pseudotsuga taxifolia*, oak (*Quercus alba* and *Q. borealis* var. *maxima*), and lime (*Tilia americana*). The fungus commonly produces fruiting bodies on *Thuja plicata* but never, so far as known, on *T. occidentalis*. The latter is affected by a similar rot of white cedar which is common in certain areas and is associated with a sterile fungus probably identical with *P. subacida*.

**ARMSTRONG (F. H.). Further tests on the effect of progressive decay by *Trametes serialis* Fr. on the mechanical strength of the wood of Sitka Spruce.**—*Forestry*, ix, 1, pp. 62-64, 1 pl., 1 graph, 1935.

The experiments briefly reported in this note showed that the reduction in compressive strength (parallel to the grain) of Sitka spruce [*Picea sitchensis*] wood stands in close relationship to the advance of decay caused by *Trametes serialis* [R.A.M., xi, p. 342] as evidenced by loss in dry weight. The progress of the decay was marked by a very much more brittle and irregular type of fracture. The results of the investigation are in close agreement with those of the previous static bending tests [loc. cit.].

INOUE (Y.). **On some physiological characters of *Stereum induratum***  
 Berk.—*Ann. phytopath. Soc. Japan*, v, 1, pp. 1-9, 1935. [Japanese, with English summary.]

When *Stereum induratum* [R.A.M., xiii, p. 135] was cultured on sixteen different media the aerial mycelium (which was almost yellow) grew best on apricot media (decoction and agar). The optimum, minimum, and maximum growth temperatures were, respectively, from 24° to 32°, a little above 4°, and between 36° and 40° C. The fungus was ascertained by Bavendamm's method to belong to the lignin-dissolving group, and to grow best in cultures containing 0.05 to 0.1 per cent. tannic or gallic acid [ibid., viii, p. 281].

CUMMINS (J. E.). **Tests of the efficacy of the oxy-acetylene scouring and charring process for sterilising partly decayed poles.**—*Pamphl. Coun. sci. industr. Res. Aust.* 57 (Tech. Pap. Div. For. Prod. 18), 43 pp., 8 figs., 1935.

A full, tabulated account, preceded by a foreword by I. H. Boas, Chief, Division of Forest Products, Commonwealth Council of Scientific and Industrial Research, is given of laboratory experiments on the new oxy-acetylene scouring and charring process, initially developed by Messrs. Allen-Liversidge (Australia), Ltd., for the treatment of partly decayed standing poles. Based on the outcome of the experimental work (in which *Eucalyptus* poles were used), the following procedure is recommended. The earth or other filling round the poles to a depth of 12 or 18 in., or to the limit of visible external decay, is removed, followed by the trimming off of any sapwood or badly mottled areas for some 30 in. above and 12 in. below ground. After ascertaining by means of a specially designed tool the exact extent of the rot and burning in the hole the chips trimmed off the pole, the prepared portion of the latter is exposed to the action of an oxy-acetylene torch, the pointed flame of which is applied to a crack or decay pocket. An area 18 in. above and from 12 to 18 in. below ground is then charred, applying the torch (with a specially constructed tip designed to give a broad, even flame) vertically and continuing until a charcoal layer about  $\frac{1}{16}$  to  $\frac{1}{8}$  in. is obtained. Warm or cold creosote oil is next applied under pressure to the pole in the form of a fine, cone-shaped spray commencing at the base and working up to the top of the area to be treated. At least four sprayings should be given at three-minute intervals. When the soil is being returned to the hole, about  $\frac{1}{2}$  to 1 gall. creosote should be puddled into it immediately round the pole. A superior creosote should be used, conforming to draft Australian Standard Specification K 55.

FROSCH (C. J.). **Chemical studies of wood preservation. V. The correlation of distillation range with the viscosity of creosote. VI. The correlation of the distillation range with the surface tension of creosote. VII. The correlation of distillation range with the interfacial tension of creosote against water.**—*Physics*, vi, 5, pp. 165-177, 5 graphs, 1935.

Viscosity being an important factor influencing the penetration, retention, permanence, and 'bleeding' of the creosotes used in wood

preservation [*R.A.M.*, vii, p. 69; xiii, p. 203], a study was made at the Bell Telephone Laboratories of the viscosity measurements of eight creosotes distilled from one tar but of various boiling ranges. All were found to be truly viscous solutions, their viscosity values being independent of pressure when observed at constant temperature. The viscosity data obtained indicated that the material boiling below 355° C. may be regarded as solvent and the residue above that temperature as solute.

The surface tensions of the eight creosotes used in these experiments were not found to differ appreciably at various temperatures (40°, 60°, 80°, and 100°). Differences in the rates of penetration of such creosotes into capillary materials are regarded as due to variations in the viscosities or the solid-liquid contact angles.

The interfacial tension values against water of the experimental creosotes were found to vary by as much as 30 per cent., although no definite trend was present that could be related to other physical properties. Two hypotheses which might account for these disparities are advanced and briefly discussed.

**WALKER (J. C.) & LARSON (R. H.). Calcium cyanamide in relation to control of clubroot of Cabbage.**—*J. agric. Res.*, li, 2, pp. 183-189, 1935.

The results [which are tabulated] of experiments carried out in continuation of the authors' studies on the control of club root of cabbage (*Plasmodiophora brassicae*) [*R.A.M.*, xiii, p. 669] showed that in greenhouse tests calcium cyanamide [*ibid.*, xiv, p. 151] at the rate of 250 lb. per acre prevented infection of the cabbage seedlings in club root-infected soil having a reaction of  $P_H$  6.4, while a dressing of calcium hydrate at the rate of 525 lb. per acre was required to accomplish the same effect. Evidence indicated that the toxicity of the former substance to the parasite is due not only to the basic compounds formed from it, but also to the  $CN_2^-$  anions in the soil solution before hydrolysis of the calcium cyanamide is complete. The doses required for effective field control were much higher, as was the case also with calcium hydrate, the results in both series of experiments indicating that calcium cyanamide is roughly about twice as effective, pound per pound, as calcium hydrate. It is suggested that in soils the acidity of which needs to be corrected to reduce club root, calcium cyanamide can be used in doses sufficient to satisfy the requirement in available nitrogen, and in cases where these doses are not sufficient to neutralize the soil acidity calcium hydrate should be used to supplement the cyanamide.

**WHITEHEAD (T.). The effects of varying the distance to which Swedes are singled.**—*Welsh J. Agric.*, xi, pp. 228-235, 1935.

The trials reported in this paper were made in 1933 and 1934 at Bangor, Wales, in view of the evidence obtained by some New Zealand workers that the damage done to swedes by dry rot (*Phoma lingam*) may be minimized by close spacing of the roots [*R.A.M.*, ix, p. 151]. The results showed that, besides its influence on dry rot which only occurred on the most widely spaced plants (0.25 per cent. affected), closer spacing also tended to reduce the incidence of bacterial crown rot

caused by a strain of *Bacillus carotovorus* [ibid., xii, p. 546], and perhaps also bacterial root rot caused by another strain of this organism. On the other hand, it had no influence on the incidence of mildew (*Erysiphe polygoni*) [ibid., xiii, p. 76] and almost certainly none on club root [*Plasmodiophora brassicae*], and tended to favour the spread of leaf spot (*Cercospora* sp.), a disease which is stated to be of less importance than the others. It was also shown to increase the fresh weight yield of the crop by at least a ton per acre, and also to increase the feeding value of the roots.

GERLACH (M.). **Die Bekämpfung der Herz- und Trockenfäule der Rüben durch borhaltige Superphosphate.** [The control of heart and dry rot of Beets by boron-containing superphosphates.]—*Superphosphat, Berl.*, xi, p. 26, 1935. [Abs. in *Chem. Zbl.*, cvi (ii), p. 1425, 1935.]

Two new fertilizers have been developed for the control of heart and dry rot of beets in Germany [*R.A.M.*, xiv, p. 733], namely, a boron-superphosphate with 5 per cent. borax and 17 to 18 per cent. water-soluble phosphorous pentoxide, and Bor-Am-Sup-Ka [ibid., xiv, p. 613], containing 2.5 per cent. borax, 6 per cent. ammonia nitrogen, 8 per cent. phosphorous pentoxide, and 12 per cent. potash, the former to be applied at the rate of 4 to 5 and the latter at 8 to 10 doppelzentner per hect.

DECoux (L.), ROLAND (G.), & SIMON (M.). **La pourriture du cœur de la Betterave en Belgique en 1934.** [Heart rot of the Beet in Belgium in 1934.]—*Publ. Inst. belge Amélior. Better.*, iii, 4, pp. 195-206, 3 figs., 1935. [Flemish, German, and English summaries.]

Exceptionally severe damage is stated to have been caused in Belgium in 1934 by heart and dry rot of sugar beets [*R.A.M.*, xiii, p. 348], which occasioned appreciable losses both among farmers and manufacturers. The disease has hitherto occurred only in a sporadic form in the country, and the recent outbreak is attributed to the coincidence of excessive drought, light soil, and high alkalinity of the latter ( $P_n$  7.35 and 8.4). A summary is given of experiments conducted in other countries on the control of the disease by the application of boron to the soil [see preceding abstract].

SCHMIDT (E. W.). **Zur pathologischen Physiologie albicater und mosaikkranker Zuckerrübenblätter.** [On the pathological physiology of albicant and mosaic-diseased Sugar Beet leaves.]—*Phytopath. Z.*, viii, 4, pp. 363-368, 1935.

Further observations and experiments at the Klein-Wanzleben Sugar Factory, Germany, on 'albinism' of sugar beet leaves, an hereditary anomaly expressed by partial or total whitening of the surface, showed that pathological modifications in assimilation, nitrate and albumin metabolism, transpiration, and respiration are associated with the disturbance. Similar but less extensive changes were found to characterize the diseased portions of mosaic foliage [*R.A.M.*, vii, p. 355].

McDONALD (I. M.). **Tests of curly-top resistant Beets.**—*Facts ab. Sug.*, xxv, 6, pp. 212-214, 1 fig., 1935.

In 1933 and 1934 the Holly Sugar Corporation, co-operating with growers in western Colorado, made a number of comparative test plantings with the U.S. No. 1 curly-top resistant strain of sugar beet [R.A.M., xiv, p. 488] and selected European types. In 1934 the disease assumed a much more virulent form than in the foregoing year, and by mid-July the average amount of curly top in test plantings in the Delta district was 90.7 per cent. for the European varieties and 71.4 for U.S. No. 1, while at the end of the season the proportion of European plants showing severe injury was about double that recorded for U.S. No. 1. In 19 out of the total of 25 test plantings made in 1933 the yield of U.S. No. 1 exceeded that of the European varieties, the greatest difference in favour of the former being 5.65 tons per acre. In 1934 U.S. No. 1 outyielded the European strains in every case by 1.16 to 8.07 tons per acre. In only five out of the total of 39 test plantings made over the two-year period did the European varieties outyield U.S. No. 1 by a maximum of 1.75 tons per acre, and in all these fields curly top was relatively insignificant. The increased yield from U.S. No. 1 seed used in the Grand Valley in 1934 is estimated at 2,828 tons of beets from 1,414 acres and in the Delta district at 8,160 tons of beets from 2,245 acres.

HUGHES (W.). **Investigations on the control of seedling diseases of Sugar Beet.**—*Sci. Proc. R. Dublin Soc.*, N.S., xxi, No. 22, pp. 205-212, 1935.

Sugar beet seed used in the Irish Free State is usually imported from the Continent, and the author gives a brief tabulated account of experiments in 1934 at Glasnevin, Dublin, in which the efficacy of seed treatment with ceresan prior to shipment, for the control of blackleg (*Phoma betae*, *Pythium de Baryanum*, and *Rhizoctonia* [*Corticium*] *solani*) [R.A.M., xiv, p. 548] was compared with treatment with one liquid (germisan) and seven proprietary dust preparations in small lots just before sowing. Preliminary tests indicated that the seed used (Kühn P) contained 12 per cent. of seed-clusters visibly affected with *P. betae* [cf. *ibid.*, xiii, p. 742], and that none of the treatments applied stimulated or increased germination of the seed, while the pre-shipment bulk treatment significantly reduced it, presumably owing to too long contact between the seed and disinfectant.

In randomized field experiments, the results of which were statistically analysed, germisan and ceresan (U.T. 1875 A) increased the number of resulting seedlings by 27.6, granosan [*ibid.*, xiii, p. 488] by 25.6, and ceresan (old) by 21.7 per cent. over the control, while the remaining treatments, including the pre-shipment one, were not significantly better than the control. The increase in the number of seedlings is attributed to the controlling effect of the preparations on *P. betae*, mainly in preventing it from killing the seedlings before their emergence above the soil.

While blackleg did not appreciably affect the number of the sugar beets after singling in the field or the yield, seed treatment is considered

necessary owing to the moist conditions which usually prevail in Ireland during late spring and are conducive to the development of the disease.

**ORTON (C. R.) & HENRY (W. D.). An internal necrosis of Bean seeds.—*Phytopathology*, xxv, 7, pp. 726-727, 1 fig., 1935.**

An apparently new disorder has been observed affecting Wooster Mammoth and Jarvis bean [*Phaseolus vulgaris*] pods in West Virginia, the former variety being the more susceptible, with 47 out of 49 pods diseased compared with 10 out of 51. The seeds (one or more in each pod) showed pale yellow to dark brown, necrotic spots of very variable diameter in the centre of the flat inner surface of both cotyledons. No external symptoms of decay were detected. Attempts to isolate a causal organism from the necrotic pods were unsuccessful, and the disturbance would appear to be of a non-parasitic nature like the similar 'marsh spot' of peas [in England and Holland: *R.A.M.*, xiv, p. 279] and the internal spotting of western peas reported by Zaumeyer and Wade from Virginia [*ibid.*, xiv, p. 341].

**MAHONEY (C. H.). Breeding Snap Beans for mosaic resistance. A progress report.—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 483-484, 1934.**

During the past four years numerous selections from commercial varieties and crosses of snap beans [*Phaseolus vulgaris*] have been tested in the field at the Michigan Agricultural Experiment Station for resistance to common mosaic (virus 1) [*R.A.M.*, xiv, p. 148]. So far only three  $F_8$  progenies out of 22 from a cross of Wells Red Kidney  $\times$  Refugee Wax showed over 10 per cent. infection, while eight were entirely free from disease; the average mosaic percentage of nine Stringless Green Refugee controls was 34.4. The above-mentioned family crossed on Green Refugee yielded 23  $F_4$  progenies of which ten showed over 10 and five under 5 per cent. infection. Only two  $F_8$  progenies out of 17 from a 'black-seeded' selection contracted more than 10 per cent. mosaic, most of the lines of this type being very slightly infected (under 5 per cent.) in the field and suffering comparatively little crop reduction. Two Refugee selections were made in 1931 and yielded one progeny with marked resistance.

**TATE (H. D.). Intracellular abnormalities associated with yellow dwarf of Onions.—*Iowa St. Coll. J. Sci.*, ix, 4, pp. 677-683, 1 pl., 1935.**

The tissues of onions affected with yellow dwarf [*R.A.M.*, xiii, p. 146] contained a few very irregularly distributed intracellular bodies commonly resembling, and sometimes indistinguishable from, nuclei (to which they were usually in close proximity), but varying greatly in size, form, and structure. It is thought that they may be of nuclear origin and possibly resulted from amitotic nuclear division. In the tissues of apparently healthy onions multinucleate cells were occasionally found, some of which showed the presence of bodies resembling those seen in the diseased onions. This, if the onions were in fact healthy, would indicate a tendency of onion cells towards the multinucleate condition; while the presence of a virus in the protoplast of the cell

would probably increase the tendency of the nucleus to divide and produce abnormalities in the nuclei.

**BÖHNE (F.). Ueber Bekämpfung wichtiger Spargelkrankheiten und Spargelschädlinge während des Sommers.** [On the control of important Asparagus diseases and Asparagus pests during the summer.]—*Obst- u. Gemüseb.*, lxxxi, 7, p. 100, 1935.

Since 1928 asparagus rust [*Puccinia asparagi*: *R.A.M.*, xiv, p. 554] is stated to have been a veritable scourge in Germany, appearing in May and June on the young plantings whence it rapidly passes to the older fields. The affected plants shrivel and are unable to absorb the necessary reserves for the next year's crop, which consequently suffers not only in quantity but in quality. The sole reliable method of control consists in the timely destruction of all dead material, more especially on the young plantings, a practice formerly compulsory in Baden, but since fallen into disuse.

**AINSWORTH (G. C.). Virus diseases of Cucumber.**—*J. Minist. Agric.*, xlvi, 4, pp. 338-344, 2 pl., 1935.

This is an abridged, popular version of the author's recent account of the three virus diseases of cucumbers known to occur in England, namely, green-mottle mosaic (cucumber virus 3), yellow mosaic (cucumber virus 4), and yellow-mottle mosaic (cucumber virus 1) [*R.A.M.*, xiv, p. 554], and of their control.

**BAILEY (R. M.) & BURGESS (I. M.). Breeding Cucumbers resistant to scab.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 474-476, 1935.

Of 125 lots of cucumber seed tested in 1931-2 for reaction to scab (*Cladosporium cucumerinum*) [*R.A.M.*, xiv, p. 182], a destructive disease in Maine, 117 exhibited no resistance in the seedling stage. Two of the remaining eight lots contracted no infection, while the others showed varying degrees of resistance. None of these, however, belonged to the popular pickling and early-slicing type. Further work on the eight resistant seed lots showed that the two remaining free from scab in the previous tests maintained their resistance on continued selfing. From the limited data available, it appears that a small number of factors, possibly only one, are involved in the inheritance of resistance to the disease.

**MAHONEY (C. H.). Seed transmission of mosaic in inbred lines of Muskmelons (*Cucumis melo L.*).**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 477-480, 1935.

In the spring of 1932 and again in 1933 several cases of mosaic occurred among seedlings grown from various muskmelon inbreds and crosses in Michigan in a form strongly suggestive of seed transmission [*R.A.M.*, xiv, p. 6]. Six out of 48 inbred progenies showed seed-borne mosaic, averaging 24 per cent. infection. Further selections were made from these progenies and in every case where the plant was infected it transmitted mosaic through the seed, the average percentage transmission being 15.6. Besides the inbreds 16 commercial varieties were grown in the field. Seed was saved from healthy and infected plants and grown in the greenhouse in the early autumn. The disease was

transmitted through the seed by all the plants of four lines showing mosaic symptoms at harvest time, the average percentage of infection ranging from 8.9 in line 1487 to 27.1 in line 1490. On the other hand, the three selections free from mosaic at harvest time did not transmit the disease to their progenies, while large healthy crops were also produced by non-infected selections from inbred Honey Rocks and open-pollinated Honey Net.

CURRENCE (T. M.) & LEACH (J. G.). **Progress in developing Muskmelon strains resistant to Fusarium.**—*Proc. Amer. Soc. hort. Sci.* 1934, xxxii, pp. 481-482, 1935.

In tests in 1933-4 in Minnesota to develop resistance to *Fusarium* wilt of muskmelons (the agent of which is stated to be allied to, possibly a mutant of, *F. niveum*) [*R.A.M.*, xiv, pp. 349, 419], a certain amount of promise was shown by the Honeydew, Casaba, Persian, and Honey Ball varieties with 35, 34, 43, and 30 per cent. infection, respectively, compared with 96 in Benders Surprise, 93 in Pollock, 89 in Sugar Rock, and 80 in Emerald Gem. Selection 73-33, with 56 per cent. infection, occupies an intermediate position between the resistant and susceptible types. The watermelon wilt due to *F. niveum* does not occur in the districts affected by the muskmelon disease, which does not, moreover, attack Kleckley Sweet watermelons, so that the origin of the severe epidemic in 1932 is obscure. According to a recent report, the same or a similar disorder occurs near Rochester, New York.

PRICE (W. C.). **Acquired immunity from Cucumber mosaic in Zinnia.**—*Phytopathology*, xxv, 8, pp. 776-789, 4 figs., 1935.

Ordinary (Porter's) cucumber mosaic and three other strains of the virus known, respectively, as 1, 2, and 9 (formerly cucumber virus Y) produce clearing of the veins and mottling of varying intensity in *Zinnia elegans* leaves, whereas strain 6 [*R.A.M.*, xiv, pp. 5, 782] causes the formation of bright yellow, later brown, necrotic lesions, sometimes involving the entire leaf and often extending down the petiole into the stem, killing the plant. *Z. elegans* plants inoculated with ordinary tobacco mosaic generally show no signs of primary infection, though small, chlorotic lesions may appear in three to five days, while vein-clearing has occasionally been observed a little later. The most prominent symptom, however, is a light and dark green foliar mottling, especially in the leaves just below the tip. Infected plants usually show extensive stunting. Tobacco aucuba mosaic produces in *Z. elegans* a mottling pattern composed of intermingled yellow areas on a dark green background, frequently accompanied by pale to vivid yellow zonate ring designs. A necrotic type of tobacco mosaic virus isolated from one of Jensen's yellow mosaic strains [*ibid.*, xiii, p. 329] produces large necrotic primary lesions on *Z. elegans* leaves, while tobacco ring spot [*ibid.*, xiv, p. 659] causes temporary vein-clearing and leaf rolling or curling and mild mottling. Similar but rather more severe symptoms are produced by Valleau's yellow tobacco ring spot virus [*ibid.*, xii, p. 471]. Transferred to *Z. elegans*, severe etch [*ibid.*, xiv, p. 782] produces persistent vein-clearing and distortion (without mottling) of the foliage and severe stunting of the plants.

*Z. elegans* plants contracting infection by any one of the four strains of cucumber mosaic mentioned above acquired immunity from the necrotic type (strain 6) of the same virus but not from the necrotic type of tobacco mosaic. Conversely, plants developing mottling by the tobacco or aucuba mosaic viruses acquire immunity from the necrotic type of tobacco mosaic but not from the necrotic cucumber mosaic strain 6. On the other hand, plants infected by tobacco ring spot, yellow ring spot, or severe etch acquire no immunity from the necrotic types either of cucumber or tobacco mosaic. The results of these experiments are considered to afford evidence of the specificity of the immune reaction in *Z. elegans* for both the cucumber and tobacco mosaic viruses.

ESAU (KATHERINE). **Initial localization and subsequent spread of curly-top symptoms in the Sugar Beet.**—*Hilgardia*, ix, 8, pp. 397-431, 4 pl., 7 figs., 1935.

Continuing her investigations of the curly-top disease of sugar beets [*R.A.M.*, xiv, p. 487], the author gives details of her anatomical studies of healthy and diseased beet plants, the results of which showed that both external and internal pathological symptoms appear in young leaves that are closely and intimately connected by phloem tissue with the inoculated leaf, and that in the fleshy tap-root phloem degeneration first sets in on the side from which the inoculated leaf diverges; later the degeneration, which at first is strictly localized, spreads laterally in each ring, and from the older to the newly developing rings. Both in the leaves and in the tap-root, phloem degeneration is initiated near the first-formed sieve-tubes, before the mature xylem and protoxylem, respectively, are differentiated. Bodies interpreted as intracellular inclusions occur commonly adjacent to the first sieve-tubes, from which the virus seems to spread in the phloem, and less frequently in cells farther away from these sieve-tubes. These inclusions eventually disappear from those cells containing them which are not necrosed, and which usually develop into elements having all the characteristics of sieve-tubes.

These results are considered to support the view that curly-top virus is translocated in the phloem tissue, in particular in the mature sieve-tubes [*loc. cit.*; cf. also *ibid.*, xiii, p. 674].

REDLICH (H.). **Résultats des essais effectués à la sucrerie de Enns pour lutter contre la cercosporiose de la Betterave (*Cercospora beticola* Sacc.) en 1934.** [The results of experiments carried out at the Enns sugar factory to combat the cercosporiosis of the Beetroot (*Cercospora beticola* Sacc.) in 1934.]—*Publ. Inst. belge Amélior. Better.*, iii, 5, pp. 275-293, 17 graphs, 1935. [Flemish, German, and English summaries.]

Almost without exception the yield of foliage, root weight, and sugar content of beets treated with Bordeaux mixture or copper sulphate dust at Enns, Upper Austria, in 1934 against *Cercospora beticola* [*R.A.M.*, xiii, pp. 316, 348; xiv, p. 548] were higher than the corresponding values for untreated material. Under local conditions it is inadvisable to commence the treatments before mid-June. In most of the tests, Bordeaux mixture proved more reliable than copper sulphate dust, six applications of the latter at 10 per cent. being required to

produce effects comparable to those given by four treatments with the former at 2 per cent. Little difference was observed between the efficacy of the 1, 1.5, and 2 per cent. concentrations of Bordeaux mixture, but a strength of 0.5 per cent. was definitely inadequate, while above 2 per cent. the cost is too high to be lucrative. A concentration of 5 per cent. was too low for the copper sulphate dust, 10 per cent. being the minimum at which satisfactory results can be anticipated. Thoroughness of application of the disinfectants was found to be quite as important as the correct timing of the treatments. Hence better results were obtained in the series of tests conducted by scientific experts than in those made in the field by the growers, although the outcome in this case also was sufficiently encouraging. Even without treatment, some [unnamed] varieties for which selection firms claim resistance to *C. beticola* yielded better than the ordinary sorts. Conversely, however, some non-resistant varieties gave higher yields than the reputedly resistant strains under the same treatment.

QUINN (D. G.). **Causes of the short Victorian vintage for 1935. Black spot and other factors.**—*J. Dept Agric. Vict.*, xxxiii, 8, pp. 397-399, 403, 2 figs., 1935.

The heavy autumn and winter rainfall in Victoria in 1934-5 is considered to have predisposed the vines to infection by *Manginia ampelina* [*Gloeosporium ampelophagum*: *R.A.M.*, xiv, p. 616], a major factor in the poor vintage of 1935. A popular note is given on the life-history of the fungus, which under local conditions affects chiefly the Sultana, Muscats, Grenache, Doradillo, Rhine Riesling, Malbec, and Carignane varieties, as well as the drying and large-fruited table sorts, and on its control by the application of a late dormant spray of iron sulphate (20 lb.) and sulphuric acid (8 lb.) in 10 gallons. water at the rate of 15 to 20 gallons. per acre. A 10 per cent. solution of sulphuric acid is also reported to have given good results. Just as the buds are bursting the vines should be treated with strong Bordeaux mixture (5-5-10) plus casein followed by another Bordeaux spraying when the shoots are 6 to 8 in. long. Later treatment against downy mildew [*Plasmopara viticola*] should also prove efficacious against *G. ampelophagum*.

BOSC (M.). **Bouillies cupriques au sulfate d'ammoniaque.** [Cupric mixtures with ammonium sulphate.]—*Progr. agric. vitic.*, ciii, 24, pp. 562-566, 1935.

The author states that very satisfactory results were obtained by French vinegrowers in 1934 by the use of ammonium sulphate [*R.A.M.*, xiv, p. 75] with cupric sprays in the control of vine mildew [*Plasmopara viticola*]. In the light of further experiments the author considers that the amount of ammonium sulphate may be advantageously reduced, excellent control having been obtained in 1934 and 1935 by the following formula: copper sulphate 3 kg., lime 2.5 to 3 kg., ammonium sulphate 0.5 to 0.8 kg., in 100 l. water.

**Legislative and administrative measures.**—*Int. Bull. Pl. Prot.*, ix, 7, p. 159, 1935.

FRANCE. By a Law of 10th March, 1935, modifying those of 4th August, 1903 and 18th April, 1922, failure to acquaint the purchaser of

a copper fungicide, raw material, or mixture with the copper content per 100 kg. of the preparation is made a punishable offence. The information is to be conveyed on the bill, invoice, packing material, advertisements, and other literature relating to the product concerned. Similar provisions are made in respect of the active elements comprised in any insecticides, fungicides, or other crop pest control materials.

**Amtliche Pflanzenschutzbestimmungen.** [Official plant protection regulations.]—*Beil. NachrBl. dtsch. PflSchDienst*, vii, 7, pp. 104-118, 1935.

GERMANY. Regulation No. 8, dated 20th June, 1935, of the General Association of the German Potato Trade defines the conditions, based on the requirements of the Reich Food Board, for internal and external commerce in table and seed (certified and uncertified) potatoes, including the limits of tolerance for certain diseases of the former. The plant protection authorities should be notified immediately by telephone of the detection of wart disease [*Synchytrium endobioticum*] in a consignment, the disposal of which will be officially arranged. In such cases the consignee is entitled to reject all liability for the goods.

**Order by the Governor under section 2 of the Protection from disease (plants) Law 1925 (Law 10 of 1925) prohibiting the removal of any Banana suckers or Plantain suckers except under the conditions stated therein. The Protection from Plant Disease (Banana and Plantain Suckers) Order, 1935.**—*J. Jamaica agric. Soc.*, xxxix, 6-7, p. 406, 1935.

The Protection from Plant Disease (Banana and Plantain Suckers) Order, 1935 (Jamaica), superseding that of 1925 [R.A.M., v, p. 63] prohibits the removal, except with an official permit, of banana and plantain suckers outside the boundaries of any one estate or two adjoining estates owned or rented by the same person or company.

**Plant Diseases Act, 1924.**—Reprinted from *Govt. Gaz.*, Sydney, 128, 2 pp., 1935.

By a Proclamation, dated 9th July, 1935, of the Governor of the State of New South Wales and its Dependencies in the Commonwealth of Australia, wheat rust (*Puccinia graminis*) is declared to be a disease within the meaning of the Plant Diseases Act, 1924. By a second Proclamation of the same date, every owner and occupier of land throughout the State is required to destroy all barberry plants growing on such land in order to prevent the spread of the said disease.

**United States Department of Agriculture. Bureau of Plant Quarantine. Service and regulatory announcements. Lists of intercepted plant pests, 1934 (list of pests recorded during the period July 1, 1933, to June 30, 1934, inclusive, as intercepted in, on, or with plants and plant products entering United States Territory).**—84 pp., 1935.

Among other interceptions made by officials of the plant quarantine and control administration of the United States Department of Agriculture during the period from 1st July, 1933 to 30th June, 1934 [cf. R.A.M., xi, p. 544], the following may be mentioned: *Elsinoe piri* [ibid., xiii, p. 76] on apple from Switzerland; *Entomosporium maculatum*

[*Fabraea maculata*: see above, p. 771] on *Raphiolepis delacouri* from the Argentine; *Physalospora eucalyptina* on *Eucalyptus* sp. from Mexico; *Septoria citri* on citrus fruits from Australia, Egypt, France, Greece, Italy [cf. *ibid.*, ix, p. 303; xii, p. 746], and Spain; *S. pittospori* on *Pittosporum* sp. from Scotland; *Sphaceloma fawcettii* var. *viscosa* on orange from Brazil; and *Phomopsis* sp. on loquat from Italy [cf. *ibid.*, vii, p. 744].

**United States Department of Agriculture. Bureau of Plant Quarantine.**  
**Fruit and vegetable quarantine. Amendment No. 6 of regulations**  
**supplemental to notice of quarantine No. 56.—2 pp., 1935.**

As from 1st August, 1935, properly dried, cured, or processed fruits and vegetables, including dried products, cured figs, dates, raisins, etc., nuts and dry beans, peas, etc., may be imported into the United States without special permit or other restriction. Except as restricted, as to certain countries and districts, by special quarantines and other orders, the following fruits may be imported from all countries under permit and on compliance with the regulations supplemental to notice of quarantine No. 56 [*R.A.M.*, iii, p. 239]: bananas, pineapples, lemons, and sour limes. European or *Vinifera* grapes and any vegetable except as restricted above may also be imported at certain authorized ports on the presentation of satisfactory evidence as to their state of health. Upon compliance with these regulations and under such additional safeguards and conditions as may be prescribed in the permits, all fruits from Victoria, South Australia, and Tasmania may be allowed entry at Seattle, Washington, and Portland, Oregon, or elsewhere as indicated in the permits. Subject to official permission fruits other than those mentioned above may be imported through specially designated ports from New Zealand, Argentina, and Chile. In conformity with the regulations under Quarantine No. 28, oranges of the mandarin class, including Satsuma [*Citrus nobilis* var. *unshiu*] and tangerine varieties, may be imported from Japan through the port of Seattle or other specified northern ports. The entry of citrus fruits from the West Indies is permitted at New York and elsewhere as designated in the permits. The entry of pineapples from Jamaica is restricted to the port of New York or other prescribed northern ports. Irish potatoes may be imported from Mexico under the conditions of the order of 22nd December, 1913. Fruits and vegetables grown in the Dominion of Canada may be imported into the United States free from any restrictions whatsoever.

**Legislative and administrative measures.—***Int. Bull. Pl. Prot.*, ix, 8, pp. 180, 184, 1935.

**ERITREA.** By a Decree of the High Commissioner for the East African Colonies, dated 13th April, 1935, the introduction into and transit through Eritrea of plants, parts of plants, and bunches of bananas is prohibited except in the case of bunches from Italian Somaliland.

**U.S.S.R.** A Verbal Note of the People's Commissary for Foreign Affairs, dated 7th April, 1935, prohibits the importation of citrus fruits (oranges, mandarins, and lemons) by way of the Black Sea ports with a view to the exclusion of pests and diseases.

## INDEX OF AUTHORS

	PAGES		PAGES
Aamodt, O. S.	349, 623	Badoux, E..	338
Abbott, E. V.	656	Baeza, M..	102, 237
Abe, T.	256	Bahrt, G. M..	442
Acton, H. W.	35	Bailey, M. A..	165
Adam, D. B.	289, 559	Bailey, R. M..	811
Adams, J. F.	496, 682	Bain, F. M..	579
Agati, J. A.	312	Baines, R. C..	371
Agronomoff, E. A.	297	Baker, R. E. D.	182, 256, 505, 627, 754
Ainsworth, G. C.	261, 366, 554, 662, 811	Bald, J. G..	781, 797
Åkerman, Å.	351	Baldacci, E..	142, 385, 405
Alabouvette, L.	786	Baldwin, I. L..	288, 289
Alben, A. O.	538	Baldwin, J. G..	568
Albert, D. W.	753	Ballard, W. S..	766
Albrecht, H. R.	174	Baribeau, B..	525
Aldaba, V. C.	312	Barillet, F..	598
Aldick, W.	102	Barnette, R. M..	576
Alexander, L. J.	202	Barrett, J. T..	195, 196
Alexandri, A. V.	713	Barrus, M. F..	784
Alexandri, V.	214	Barthelet, J..	42, 314, 454, 595
Alexopoulos, C. J.	587	Bartlett, K. A..	444
Alicbusan, L. A.	567	Barton-Wright, E. C..	784
Allen, F. R. W. K.	446	Bates, G. H..	789
Allen, F. W.	770	Baumli, H..	584, 697
Allen, M. C.	463	Bavendamm, W..	476
Allen, R. F.	170, 309, 438	Bawden, F. C..	328, 713
Allison, C. C.	352, 353	Baxter, D. V..	805
Almon, L.	34	Beale, H. P..	197, 601
Altson, R. A.	31	Beattie, R. K..	338, 406
Anderson, H. W.	642	Beaumont, A..	366, 676
Anderson, J. A.	293	Beaumont, A. B..	645
Anderson, M. E.	732	Beckenbach, J. R..	382
Anderson, P. J.	724	Becker, K. E..	20
Anderson, W. P.	642	Beckley, V. A..	755
Andres, H.	364	Beeley, F..	331
Andrus, C. F.	416, 669	Bekker, J. G..	236
Angell, H. R.	89	Bell, A. F..	332, 532
Anson, R. R.	98	Benham, R. W..	100
Anthony, M. V.	598	Bennett, C. W..	549
Antoniades, P.	347	Bennett, F. T..	449, 587, 588
Appel, O.	299	Bensaude, M..	119
Arakawa, S.	332	Bentley, S..	9
Arata, M.	602, 783	Benvegnin, L..	76
Ark, P. A.	702, 744	Benz, P..	596
Armand, L.	762	Beran, F..	518
Armet, H.	75	Beresova, E..	634
Armstrong, F. H.	413, 805	Berg, A..	372
Arnaud, G.	133, 377, 454	Berkeley, G. H..	179, 261, 610
Arthold, M.	11	Bernon, G..	420, 616
Artom, M.	35	Bessey, E. A..	708
Ashcroft, J. M.	407	Bever, W. M..	499
Ashworth, D.	464	Bevilacqua, I..	705, 749
Askew, H. O.	770	Bewley, W. F..	74, 637, 638
Asperger, K.	499	Beyers, E..	441, 491
Asuyama, H.	498, 796	Bindfeil..	570
Atanasoff, D.	367, 462, 505, 642	Biraghi, A..	296, 467
Atkin, L.	691	Birch, T. T. C..	541
Atkinson, J. D.	592	Birkeland, J. M..	186
Auchinleck, G.	14	Birmingham, W. A..	618
Aughanbaugh, J. E.	800	Bisby, G. R..	383, 791
Austin, M. D.	769	Bittmann..	134
Ayers, T. T.	266	Black, W..	465
Babel, A.	384, 519, 763	Blackburn, K. B..	245
Bade, O.	545	Blank, L. M..	414, 485
Bader, A.	88	Blauvelt, W. E..	768
		Bliss, D. E..	706

## INDEX OF AUTHORS

	PAGES		PAGES
Blochwitz, A.	796	Bunyard, G. N.	698
Blodgett, E. C.	377	Burges, A.	134
Blodgett, F. M.	606, 716, 789	Burgess, I. M.	811
Bockmann, H.	351, 570, 748	Burgevin, H.	282, 555
Boczkowska, M.	629	Burke, O. D.	789
Bodine, E. W.	44	Burkholder, W. H.	365
Böhne, F.	811	Burnett, G.	661
Bolle, P. C.	58	Butcher, R. W.	599
Bongini, V.	106, 449, 616	Butler, E. J.	87
Böning, K.	159, 299, 404, 419, 659	Butler, K. D.	738
Borchers, F.	518	Buzzati-Traverso, A.	764
Bordas, J.	245		
Bordelau, R.	403	Cairns, H.	796
Borg, P.	618	Caldwell, J.	261, 262, 535, 600
Borisewitch, G. F.	551	Calinisan, M. R.	311, 312
Borisoff, P. N.	62	Callenbach, J. A.	673
Börner, C.	285	Calniceanu, C.	226
Borthwick, H. A.	141	Caminha, A.	718
Bortner, C. E.	534	Camp, A. F.	441, 481
Borzini, G.	690	Campbell, W. G.	542, 543, 667
Bosc, M.	814	Canna, S.	383
Bose, S. R.	193, 611, 794	Capt, E.	76
Boshart, K.	56	Carbone, D.	188, 602, 713
Bottomley, A. M.	452	Carne, W. M.	242, 769
Boudru, M.	478, 479	Carpenter, C. W.	530
Bouffard, E.	347	Carrothers, E. N.	796
Bouriquet, G.	87, 334, 685	Carsner, E.	488
Bourne, A. I.	33	Carteaud, A.	581
Bourne, B. A.	57, 257	Carter, F. M.	369
Bovey, P.	324	Carter, J. C.	387, 537
Boyd, E. S.	135	Carter, W.	378, 379, 580
Boyd, O. C.	404	Casaburi, V.	114
Boyes, W. W.	491	Cassell, R. C.	30, 350
Boyle, L. W.	362	Castellani, A.	308
Bracken, A. F.	89	Catalano-Giambra, R.	619
Branas, J.	420, 421, 597, 616	Catanei, A.	168
Branchini, B.	581	Cation, D.	318
Brandenburg, E.	256, 732	Cecarelli, A.	765
Bratley, C. O.	450	Chabrolin, C.	429
Braun, H.	389	Challenger, F.	783
Breazzano, A.	3	Chamberlain, E. E.	109, 179, 262, 466, 717
Brejneff, I. E.	277	Chandler, N.	283
Bremer, H.	553	Chandler, W. H.	176, 642, 767
Brenchley, G. H.	772	Chan-Tsi, W.	745
Brentzel, W. E.	784	Chardon, C. E.	397
Brian, P. W.	730, 791	Charles, V. K.	408
Brieger, F. G.	446	Chaudhuri, H.	323, 379, 571, 692
Brien, R. M.	109, 546	Chavarria, A. P.	168
Brierley, P.	363	Chaze, J.	490, 554, 674, 739
Brink, R. A.	174	Cheal, W. F.	590
Briton-Jones, H. R.	224, 627	Cheema, G. S.	517
Brodie, H. J.	645	Cheo, C. C.	778
Brömmelhues, M.	688	Chester, K. S.	245, 385, 781, 782, 798
Brooks, C.	41, 450, 461	Chevalier, A.	154, 212
Brooks, F. T.	479, 772	Chevalier, G.	75
Brown, A. M.	225	Ch'in, T. L.	632
Brown, J. G.	115	Chittenden, F. J.	239
Brown, N. A.	174	Choisnard, A.	598
Brown, W.	189	Christensen, C.	137
Brunetto, S.	169	Christensen, J. J.	353, 436, 503, 504
Brunson, A. M.	232	Christoff, A.	17, 49, 316, 341, 639
Bryant, S. A.	543	Chupp, C.	486
Buchholz, W. F.	241, 588	Churchward, J. G.	88, 571
Buchwald, N. F.	239	Ciferri, R.	99, 100, 169, 234, 235, 361, 362, 405, 444, 445, 446, 582, 758, 760
Bugnicourt, F.	126, 468, 480	Clara, F. M.	16, 755
Buisman, C. J.	264, 664	Clark, G. E. M.	154
Buller, A. H. R.	183	Clark, J. A.	619
Bundel, A. A.	297	Clarke, H. R.	545
Bunting, G.	357		

## INDEX OF AUTHORS

819

	PAGES		PAGES
Clausen	160	Deighton, F. C.	427
Clayton, E. E.	403, 657	Delevoy, G.	478
Cleary, E. C.	618	Demandt, E.	257
Clinch, P.	604	D'Emmerez de Charmoy, D.	56
Clinton, G. P.	476	Demolon, A.	555, 743
Cochran, L. C.	418	De Monbreun, W. A.	445
Cockerham, G.	784	Dennis, R. W. G.	136, 690
Cohen, R.	581	Denniston, L. T.	391
Colby, A. S.	642, 774	De Ong, E. R.	519
Cole, J. R.	537, 538	Desai, G. H.	507
Colhoun, J.	701	Desai, S. V.	394, 395
Collins, E. J.	788	Dessy, G.	583
Collins, J. F.	266	Detwiler, S. B.	455
Collins, W. B.	489	De Villiers, D. J. R.	491
Comte	674	Diddens, H. A.	69
Conant, N. F.	581	Diehl, R.	250
Connors, I. L.	494	Diller, J. D.	540
Cook, H. T.	417, 673	Dix, W.	328
Cook, M. T.	51	Dixon, L. F.	723
Cook, W. R. I.	489	Dodd, K.	446
Coley, J. S.	373	Dodge, B. O.	38
Copisarow, M.	450	Doery, A. C.	568
Cormack, M. W.	175	D'Oliveira, M.	514
Corneli, E.	620, 646	Donen, I.	321
Corner, E. J. H.	711	Doolittle, S. P.	62
Costantin, J.	602	Dopp, E.	94
Cotter, R. U.	155	Dorojkin, N. D.	330
Couch, J. N.	758	Dorph-Petersen, K.	383
Coupan, G.	716	Dounin, M. S.	297, 651
Crandall, B. S.	409	Dowding, E. S.	760
Crawford, R. F.	7	Downing, J. G.	631
Cristinzio, M.	777, 786	Dowson, W. J.	211, 514
Crosby, C. R.	768, 784	Drake, C. J.	51
Crosier, W.	2, 391	Drechsler, C.	99, 124, 360, 417, 467, 508, 514
Cross, W. E.	394	Dreyer, D. J.	754
Crowell, I. H.	771	Duché, J.	581
Csorba, Z.	639	Ducomet, V.	250, 786
Cummins, J. E.	806	Dudley, H. W.	511
Currence, T. M.	419, 812	Dufrénoy, J.	154, 199, 202, 246, 272, 302, 492, 506, 600, 628, 661, 744
Curzi, M.	195	Duggar, B. M.	401, 799
Da Fonseca, O.	308	Dulac, J.	421, 597, 674
Dana, B. F.	339	Dundas, B.	207
Dani, P. G.	517	Dunegan, J. C.	178, 319, 381
Darker, G. D.	802	Dunex, A.	743
Darling, H. M.	389	Du Plessis, S. J.	213, 453, 491
Darrow, G. M.	455	Dupont, P. R.	305
Das Gupta, S. N.	249	Dupuy, A.	675
Da Silveira e Azevedo, N. A.	790	Durham, H. E.	9
Dastur, J. F.	717	Dutt, K. M.	257
Davidson, R. W.	663, 725, 729	Eardley, E. A.	565
Davies, C.	778	Eastham, J. W.	495
Davies, R.	96, 440	Eaton, E. D.	304, 442, 443
Davis, G. N.	750	Eckersley, A. M.	137
Davis, L. L.	119	Edgerton, C. W.	469
Davis, M. C.	766	Edson, H. A.	533
Davis, W. H.	340	Edwards, E. T.	516
Dawson, G. T.	25	Ehrke, G.	717
Dawson, P. R.	442	El-Helaly, A. F.	451
Day, W. R.	803	Elliott, C.	94, 752
Deacon, G. E.	363	Elze, D. L.	577
De Bonis, E.	534	Emmons, C. W.	101
De Bruyn, H. L. G.	415, 546	Endō, S.	120, 652
De Castella, F.	8	Esau, K.	487, 813
De Chiara, C.	509	Esmarch, F.	203, 389
Decker, P.	380	Ewert, R.	629
Decoux, L.	808	Ezekiel, W. N.	304, 360
De Gregorio, E.	102		
De Haan, K.	549, 733		

	PAGES		PAGES
Faes, H.	145, 324	Goldin, M. M.	542
Fahmy, T.	614	Goldsworthy, M. C.	381
Fajardo, T. G.	140, 343	Gomez-Vega, P.	758
Farber, G. J.	759	Gonçalves da Cunha, A.	119
Farley, A. J.	175	Goodwin, W.	769
Fawcett, G. L.	529, 531	Goossens, J.	40
Fawcett, H. S.	163, 188, 233, 578, 627	Goryainoff, A.	47
Fellows, H.	230, 433	Goryatchikh, A. N.	297
Ferraris, T.	75, 491	Goto, K.	387, 399, 735
Ficke, C. H.	433	Gongerot, H.	581
Fikry, A.	177	Graber, L. F.	638
Finch, A. H.	753	Graf-Marin, A.	25
Finlayson, E. H.	540	Graham, T. W.	353, 433
Fischer, G. W.	746	Granhall, I.	351
Fish, S.	43, 610	Grasovsky, A.	30
Fisher, D. F.	450	Gratia, A.	185, 327
Fisher, E.	375	Gravatt, G. F.	726
Fittipaldi, C.	306, 307, 582	Graves, A. H.	611
Fitzpatrick, R. E.	594	Graves, C. E.	612
Flachs, K.	766	Greaney, F. J.	298, 569, 688
Flint, W. P.	642	Green, D. E.	107, 173, 313, 513, 585
Focosi, M.	36	Green, E. L.	381
Foëx, E.	282, 423, 502, 786	Gregor, M. J. F.	797
Folsom, D.	54	Gregory, P. H.	580
Forbes, I. L.	747	Greisenegger, K.	464
Foster, A. C.	343	Grieve, B. J.	111
Foster, H. H.	371	Grochowska, Z.	49
Fraser, L.	59, 60	Grooshevoy, S. E.	17
Freitag, J. H.	171	Grossman, H.	310
Frémont, T.	710	Grove, W. B.	193
Frey, C. N.	691	Guba, E. F.	74
Fritz, C. W.	484	Guilliermond, A.	693
Fron, G.	282, 552	Güll, A.	317, 589
Frosch, C. J.	806	Gunn, K. C.	165, 166
Frost, K. R.	708	Guterman, C. E. F.	364, 365
Fukushi, T.	468	Guthrie, J. D.	601
Gadd, C. H.	657	Gutzevitch, S. A.	278
Galloway, L. D.	585	Guyot, A. L.	570
Gante, T.	447, 536	Haas, A. R. C.	628
Garber, R. J.	29, 354	Haasis, F. A.	312
Garbowski, L.	526	Haenseler, C. M.	53, 181, 463, 671
Gardner, H. A.	520	Hafstad, G. E.	355
Gardner, M. W.	201, 212, 404, 670	Hagander, H.	351
Gaschen, H.	709	Hahn, G. G.	266, 377
Gassner, G.	296, 300	Hall, J. W.	769
Gaudineau, M.	594	Halle, J.	157
Gäumann, E.	141, 785	Haller, M. H.	773
Gauthier, M.	630	Hamilton, J. M.	382, 590
Genevois, L.	492	Hamond, J. B.	408, 801
Georgi, C. D. V.	357	Händler, E.	700
Gerlach, M.	808	Hanna, W. F.	432, 573, 745
Germar, B.	25	Hansbrough, J. R.	612
Gewecke, F.	667	Hansen, H. N.	176, 195, 710
Ghesquière, J.	166	Hansford, C. G.	81, 97, 793
Ghimpur, V.	474, 710	Hansmann, G. H.	235
Ghosh, L. M.	35	Harding, P. L.	592, 773
Gibbs, J. G.	278, 546, 732	Hargreaves, E.	739
Gigante, R.	11, 328, 489	Harland, S. C.	164
Gilbert, W. W.	628	Harley, C. P.	41, 701
Gioelli, F.	30	Harley, J. L.	327
Giordano, A.	694	Harnett, J.	74
Glingani, A.	104	Harris, R. V.	642
Glynn, M. D.	55, 621	Harrison, A. L.	385
Godfrey, A. B.	434	Harrison, J. W.	249
Goetz, O.	374	Harrison, K. A.	591
Goidàñich, Á.	133, 264	Harrison, T. H.	451, 703, 704, 774
Goidàñich, G.	133, 264, 320, 373, 454, 702, 727, 800	Hart, H.	747
		Hart, L. P.	520

	PAGES		PAGES
Harter, L. L.	71, 118, 279, 669	Hubbard, V. C.	436
Hartisch, J.	190	Hubert, E. E.	482, 727, 728
Hartley, C.	409	Hughes, W.	551, 809
Hartzell, A.	705	Hugues, E.	347
Hatch, A. B.	187	Hukano, H.	618
Haussmann, G.	373	Hull, R.	775
Havelik, K.	481	Hülsenberg, H.	489, 554, 715
Hawkins, S.	475	Humphrey, H. B.	348, 499, 567
Hazard, J. B.	631	Hungerford, C. W.	339
Headlee, T. J.	175	Hunter, J. H.	442
Hédin, L.	676	Hunter, L. M.	410
Hege, R.	519	Hurst, R. R.	70
Hellinger, E.	506	Husfeld, B.	285
Hemmi, T.	596	Husz, B.	773
Hendee, E. C.	166	Hüttig, W.	725
Henderson, R. G.	403	Hynes, H. J.	618, 621
Hendrickson, A. A.	289		
Hendrickx, L.	448	Ikeno, S.	764
Hengl, F.	11	Imai, Y.	4
Henrard, P.	522	Inoue, Y.	806
Henrici, A. T.	523	Isaac, W. E.	319
Henrick, J. O.	425, 703	Isaakides, C. A.	644
Henry, A. W.	465	Isenbeck, K.	439
Henry, W. D.	810	Israilevsky, V.	17
Héranger, S. F.	556	Ito, S.	59
Herbert, D. A.	124	Ivanoff, S. S.	354, 452
Hermann, S.	90, 228	Iyengar, A. V. V.	477, 538, 783, 801
Herwick, H. T.	52, 522	Iyengar, K. G.	204
Hey, A.	387, 388		
Hibbard, P. L.	176, 767	Jacks, G. V.	469
Hidaka, Z.	107	Jackson, L. W. R.	408, 409
Higginbottom, C.	783	Jacono, I.	308
Higgins, B. B.	344	Jacot, A. P.	63
Hikscht, F.	725	Jagger, I. C.	283
Hildebrand, A. A.	393	Jahn, E.	247
Hildebrand, E. M.	369, 370	James, N.	791
Hill, A. V.	723	Jamieson, W. A.	695
Hines, L.	350	Jany	651
Hino, I.	107	Jaretzky, R.	697
Hirane, S.	611	Jary, S. G.	769
Hiratsuka, N.	516, 533, 654, 719	Jay, B. A.	413
Hiroe, I.	344, 528	Jenkins, A. E.	171, 459, 763
Hirschhorn, J.	27	Jensen, H. L.	121
Hitchcock, J. A.	714	Jensen, V.	114
Hiura, M.	1, 576	Jiromskaya, E. N.	281
Hjort, A.	648	Johann, H.	355
Hoagland, D. R.	176, 376, 642, 767	Johansson, N.	181
Hoerner, G. R.	607	Johnson, E. M.	335, 723
Hoette, S.	517	Johnson, I. J.	436, 504
Hoffman, M. B.	183	Johnson, J.	521, 523, 731
Hoffmann	229	Johnson, M. O.	455
Hoggan, I. A.	473, 521, 534, 731	Johnson, O.	226
Holmes, F. O.	61, 126, 198	Johnson, T.	226
Holmes Smith, E.	117	Johnston, C. O.	88, 432, 499
Holz, W.	589	Johnston, W. H.	158, 623
Honecker, L.	92, 624	Jones, F. R.	174, 638, 766
Hoover, M. M.	29, 354	Jones, G. H.	158, 741
Hope, C.	442, 443	Jones, J. W.	119
Hopkins, J. C. F.	200, 233, 427, 474, 626, 677	Jones, L. K.	190, 211, 661
Hori, M.	790	Jones, W.	605
Horne, A. S.	40, 588	Jordan, H. V.	442
Horne, W. T.	707	Jørstad, I.	251, 258
Horowitz-Wlassova, L. M.	604	Jungherr, E.	511
Horsfall, J. G.	382, 519	Kaden, O. F.	566, 578
Hotson, J. W.	205, 258	Kadow, K. J.	283, 377, 662
Howard, F. L.	240	Kaess, G.	633
Howatt, J. L.	547, 649	Kaho, H.	465, 785
Hruszec, H.	580	Kalandra, A.	536

	PAGES		PAGES
Kaliaeff, A.	712	Küssner, W.	93
Kamat, M. N.	654	Küthe, K.	316
Kamesam, S.	138		
Kanegae, H.	1	Labrousse, F.	285
Karatchevsky, I. K.	128, 130, 131	Lacey, M. S.	279
Karling, J. S.	259	Lachmund, H. G.	66, 135
Kärst, O.	667	Lagerberg, T.	803
Kaven, G.	38, 173	Lamb, H.	318, 725
Kawamura, E.	314	Lamb, J. H.	444
Kazakova, A.	17	Lamb, M. L.	444
Kearns, H. G. H.	701	Lami, R.	600
Keitt, G. W.	381	Lanphere, W. M.	266
Kendrick, J. B.	6, 207, 210, 283	Lanshina, M. N.	116
Kent, W. G.	242	Larson, R. H.	206, 807
Khan, M. A.	160	Larue, P.	675
Kharasch, M. S.	696	László, S.	741
Kheswalla, K. F.	126	Latham, D. H.	280
Kidd, F.	41, 42	Latham, J.	413
Kikuchi, M.	634	Lathbury, R. J.	431
Kile, R. L.	509, 632	Laubert, R.	239
Kilmer, F. B.	452	Lauder-Thomson, I.	179
Kimmey, J. W.	410	Laumont, P.	91
Kinberg, W.	206	Lauritzen, J. I.	118, 528
King, C. J.	304, 442, 443	Lavier, G.	757
Kingery, L. B.	105, 584, 759	Lea, C. H.	309
Kinnison, A. F.	753	Leach, J. G.	137, 389, 419, 812
Kirby, G. W.	691	Leach, L. D.	141, 488
Kirchhoff, H.	296, 300	Leach, R.	14, 561
Kisser, J.	48	Leão, A. E. de A.	170
Kitabatake, E.	510	Lebasque, J.	103
Klapp, E.	54, 650	LeClerg, E. L.	207, 488
Klebahm, H.	419	Ledingham, G. A.	525
Klem, P.	545	Lee, A. A.	22
Klemm, M.	88	Lefebvre, C. L.	444
Klinkowski, M.	387	Legault, R. R.	696
Klotz, L. J.	163, 233, 578	Léger, L.	630
Kobayasi, T.	309	Lehman, H.	391
Koch, F. C.	276	Lehmann, E.	88, 568
Koch, K.	190, 523	Lemesle, R.	699
Koch, L. W.	43, 177, 593, 772	Leonard, E. R.	182
Kochman, J.	398	Leonian, L. H.	398
Köck, G.	464	Lepik, E.	529
Koehler, B.	355	Leszczenko, P.	520, 526, 527
Köhler, E.	388, 780	Leukel, R. W.	159
Kokin, A. J.	300	Levine, M.	30
Korenec, N. A.	297	Levine, M. N.	350
Korff, G.	419	Levón, M.	729
Kostoff, D.	116	Lewcock, H. K.	457, 458
Kotchikina, E. M.	67	Lewis, G. M.	500
Kotte, W.	296	Li, H. W.	691
Kovačevski, I. C.	1	Liese, J.	68, 411
Kozłowski, A.	449	Likhite, V. N.	359, 507
Krámský, O.	156	Lindau, G.	650
Krantz, F. A.	389	Lindbergh, C. A.	461
Kraus, E.	733	Lindfors, T.	21, 787
Kravtchenko, A.	712	Lindner, R. C.	766
Krug, H. P.	629	Lindquist, J. C.	40
Krüger, W.	73	Link, G. K. K.	370
Kubienz, W.	392	Link, K. P.	553
Kulkarni, G. S.	358	Liro, J. I.	771
Kulkarni, L. G.	155	Liu, K. P.	510
Kulkarni, V. G.	359	Livingston, L. G.	799
Kummer, H.	568	Lobo, J.	170
Kunkel, L. O.	374, 399	Lockwood, L. B.	522, 694
Kupke, W.	545	Lodder, J.	192
Kuplenskaya, O. I.	123	Loewel, E. L.	371, 517
Kuprewicz, V. F.	52	Loh, T. C.	119
Kurata, S.	596	Loughnane, J. B.	604
Kurochkin, T. J.	307	Lowe, J. L.	193

	PAGES		PAGES
Lowig, E. . . . .	571	Mattirolo, O. . . . .	783
Luchetti, G. . . . .	328	Maublanc, A. . . . .	303, 357
Luckan . . . . .	775	May, C. . . . .	406
Lüdecke, H. . . . .	73, 141	May, E. . . . .	518
Lund, A. . . . .	59	May, O. E. . . . .	52, 522
Lunden, A. P. . . . .	251	Mayers, N. . . . .	603
Lüstner, G. . . . .	536, 557, 586	Mayne, W. W. . . . .	164
Luthra, J. C. . . . .	22, 156	M'Bain, A. M. . . . .	784
Lutz, L. . . . .	339	McAlister, D. F. . . . .	401
Luz, G. . . . .	310	McCallan, S. E. A. . . . .	244
Lyon, H. L. . . . .	530	McClean, A. P. D. . . . .	799
Lyubarsky, L. V. . . . .	662	McCleery, F. C. . . . .	161, 618
MacDaniels, L. H. . . . .	370	McCormack, R. B. . . . .	789
MacDonald, J. A. . . . .	279, 557	McCormick, F. A. . . . .	476
MacDowall, R. K. . . . .	789	McCREA, A. . . . .	105, 137, 784
MacGregor, J. W. . . . .	760	McDonald, C. . . . .	169
Machacek, J. E. . . . .	298, 569, 688	McDonald, I. M. . . . .	809
Macindoe, S. L. . . . .	573	McDonald, J. . . . .	426
Mackie, W. W. . . . .	208	McKay, R. . . . .	488
Mackinnon, J. E. . . . .	509	McKinnon, L. R. . . . .	770
MacLachlan, J. D. . . . .	368	McLean, R. A. . . . .	723
MacLeod, D. J. . . . .	547, 649	McLennan, E. I. . . . .	462
Macy, H. . . . .	236	McMahon, W. . . . .	276
Mader, E. O. . . . .	606, 716, 789	McMartin, A. . . . .	98, 234, 470
Magalhães, O. de . . . . .	759	McMurtrey, J. E. . . . .	609
Magée, C. J. . . . .	55, 610	McNamara, H. C. . . . .	165
Magie, R. O. . . . .	376, 455	McNew, G. L. . . . .	706, 751
Magrou, J. . . . .	430, 602	McRae, W. . . . .	80, 122, 191
Mahoney, A. E. . . . .	726	McWhorter, F. P. . . . .	586
Mahoney, C. H. . . . .	752, 810, 811	Meginnis, H. G. . . . .	666
Mains, E. B. . . . .	229, 499, 794	Mehlisch, K. . . . .	637
Maire, R. . . . .	333	Mehrlich, F. P. . . . .	194, 604
Maklakova, G. F. . . . .	17	Mehta, P. R. . . . .	161, 439
Malençon, G. . . . .	302	Meier, F. C. . . . .	384, 461
Malherbe, I. de V. . . . .	42	Meijer, C. . . . .	209
Mallamaire, A. . . . .	153	Melander, L. W. . . . .	687
Mand . . . . .	93	Melchers, L. E. . . . .	227, 232
Mandelson, L. F. . . . .	335	Melin, E. . . . .	274
Maney, T. J. . . . .	592, 770	Menchikowsky, F. . . . .	753
Manil, P. . . . .	185, 259, 326, 327, 447	Mercer, S. T. . . . .	759
Manns, M. M. . . . .	682, 704	Mes, M. G. . . . .	238
Manns, T. F. . . . .	682, 704	Meyer, E. I. . . . .	267, 268, 269
Mansour, K. . . . .	305, 306	Meyer, J. . . . .	584, 631, 695, 697
Marcel, M. . . . .	555	Meyer-Bahlburg, W. . . . .	570, 606
Marchal, É. . . . .	679	Meyer-Hermann, K. . . . .	433
Marchionatto, J. B. . . . .	14, 98, 223, 371, 500, 630, 720	Michaelis, P. . . . .	464
Marsais, P. . . . .	675	Mikhailova, P. V. . . . .	116, 117, 128, 724
Marsh, R. W. . . . .	701	Milanez, F. R. . . . .	778
Martin, D. . . . .	242, 769	Miles, L. E. . . . .	59, 253
Martin, H. . . . .	701, 769	Miller, E. C. . . . .	432
Martin, J. N. . . . .	51	Miller, P. W. . . . .	204, 477
Martin, J. P. . . . .	530	Miller, V. V. . . . .	267, 268, 271
Martin, L. D. . . . .	789	Miller, W. B. . . . .	24
Martin, W. H. . . . .	150, 175	Millikan, C. R. . . . .	24
Martiny . . . . .	501	Mills, P. J. . . . .	469
Martyn, E. B. . . . .	217	Mills, W. D. . . . .	768
Masano, N. . . . .	547	Milochevitch, S. . . . .	35, 102, 632
Maschhaupt, J. G. . . . .	29	Milsum, J. N. . . . .	357
Masera, E. . . . .	265, 361	Mitra, A. . . . .	242, 472
Mason, J. H. . . . .	236	Mitra, M. . . . .	90, 144, 161, 439
Massee, A. M. . . . .	595	Mitter, J. H. . . . .	470
Massey, L. M. . . . .	763	Mittmann, G. . . . .	88
Massey, R. E. . . . .	96, 656	Mix, A. J. . . . .	374
Matsumoto, H. . . . .	254, 296	Moir, C. . . . .	511
Matsumoto, T. . . . .	395, 402, 531, 686, 699, 795	Molander, A. R. . . . .	709
Matthews, I. . . . .	753	Moll, F. . . . .	542
		Molliard, M. . . . .	247
		Momose, I. . . . .	657
		Montemartini, L. . . . .	640

	PAGES		PAGES
Moore, H. C.	118	Olsen, C.	121
Moore, M.	509, 582, 583, 632, 696	Oltarjevski, N. P.	9
Moore, M. B.	30, 352, 353	Oort, A. J. P.	89
Moore, W. D.	416	Orchard, O. B.	636, 638, 662
Morgenthaler, O.	54	Orloś, H.	663
Morgenweck, G.	650	Orner, H.	114
Morstatt, H.	324, 461	Orr, L. W.	137
Morwood, R. B.	572	Orth, H.	391
Mosseray, R.	334	Orton, C. R.	420, 810
Motte, M. H.	485	Osborn, H. T.	415, 486
Mourashkinsky, F.	23	Osmun, A. V.	683
Mourashkinsky, K. E.	22, 493	Otero, J. I.	51
Mowry, H.	481	Otomo, S.	671
Müller, A. S.	87, 634, 734	Overholts, L. O.	258, 795
Müller, J. F.	694	Oyler, E.	637
Müller, K. O.	390		
Müller-Kögler, E.	157	Padwick, G. W.	622
Mulligan, B. O.	414, 730	Pady, S. M.	642
Muncie, J. H.	752	Painter, A. C.	641
Mundkur, B. B.	106, 125, 160, 231	Pal, B. P.	567
Murat, M.	91	Palm, R. T.	340, 699
Murphy, H. C.	353, 435, 499, 625	Palmiter, D. H.	369, 381
Murphy, P. A.	551	Palo, M. A.	140, 343
Murray, R. K. S.	654	Pape, H.	39, 364, 731
Muskett, A. E.	701, 796	Parham, B. E. V.	44, 337
Myers, H. E.	95	Park, M.	17, 145, 261
Myers, J. G.	155	Parker, E. R.	506
Nagai, Y.	501	Parker, K. G.	111
Nagel, C. M.	195	Pascalet, M.	31
Nannfeldt, J. A.	274	Pasinetti, L.	764
Nannizzi, A.	167	Patay, R.	507
Naoumoff, N. A.	245	Patel, M. K.	654
Narasimhan, M. J.	649	Pavarino, G. L.	356, 373, 422
Nattrass, R. M.	83, 706, 734, 741	Pawson, W. W.	191
Neal, D. C.	166, 628	Peace, T. R.	803
Neiger, R.	90, 228	Pearson, E. O.	97
Neill, J. C.	109, 558, 762	Peek, R. L.	139
Nelson, R.	418	Peltier, G. L.	109, 515
Nelson, R. M.	68	Percival, W. C.	66
Němec, A.	650	Perlberger, J.	162
Newhall, A. G.	417, 460	Persons, T. D.	4
Newton, M.	225	Petch, T.	33, 443
Newton, W.	603	Peters, F.	411
Niemeyer, L.	740	Petersen, H. E.	50, 326
Niethammer, A.	655	Peterson, W. H.	522
Nieves, R.	29, 625	Petherbridge, F. R.	547
Nikiforoff, A.	47	Pethybridge, G. H.	279
Nilsson-Leissner, N.	315	Petit, A.	572
Ninni, C.	306, 307, 582	Petrak, F.	124, 793
Nisikado, Y.	254, 275, 296, 804	Petre, A. W.	609
Nisiköri, T.	299	Petri, L.	8, 317, 679
Nitimargi, N. M.	452	Petroff, A. D.	324
Noack, E.	38	Peyronel, B.	463
Nobindro, U.	630	Pfankuch, E.	650, 785
Noble, R. J.	347, 618	Pfeffer, A.	536
Nolla, J. A. B.	660	Pichler, F.	501, 619
Norman, A. G.	55, 603	Pickett, A. D.	579
Nose, T.	640, 653	Pickett, B. S.	592
Novotelnow, N. W.	604	Pierce, A. S.	203
Nowak, A.	411	Pierce, L.	381, 452
Nusbaum, C. J.	368	Pierce, W. H.	72
Ocfemia, G. O.	37, 608	Pierstorff, A. L.	318
O'Connor, C.	330	Pieschel, E.	53
Oettingen, H. v.	39	Pinckard, J. A.	686
Ogilvie, L.	414, 725, 730, 771, 791	Pittman, H. A.	129, 315, 520, 706
Okabe, N.	355, 686, 738	Pivovarova, R. M.	116
Olah, D.	694	Pizer, N. H.	769
		Plagge, H. H.	243, 592, 770

	PAGES		PAGES
Plakidas, A. G.	776	Reus Rath, T.	212
Plunkett, O. A.	235	Reyes, G. M.	120, 314, 323
Poeverlein, H.	446	Rhoads, V. H.	626
Pohjakallio, O.	52	Riccardo, S.	801
Pohlmann, J.	366	Richardson, N. A.	70
Poisson, R.	507	Richter, H.	108
Pole Evans, I. B.	426	Rick, J.	333
Pollacci, G.	424, 510, 724	Rieger, H.	527
Pomerleau, R.	409	Riker, A. J.	288, 289, 354, 369, 452, 766
Poos, F. W.	94	Rivera, V.	384, 600
Popp, W.	573, 745	Rives, L.	676
Porges, N.	694	Roark, R. C.	707
Porte, W. S.	263	Robak, H.	140
Porter, D. R.	714, 786	Robbins, W. J.	115
Portheim, L.	48	Roberts, J. W.	381, 452
Potts, G.	414	Roberts, R. H.	180
Poulsen, A.	27	Robertson, W. A.	136
Povah, A. H. W.	794	Robson, G.	628
Powell, H. M.	695	Rodenhiser, H. A.	438
Preston, N. C.	2	Rodigin, M.	343
Prete, G.	636	Roepke, W.	665
Price, W. C.	5, 812	Roger, L.	303, 357, 396
Prill, E. A.	522	Roland, G.	549, 808
Proctor, B. E.	326	Roldan, E. F.	532
Prodan, I.	483	Rolet, A.	244
Puffeles, M.	753	Romell, L. G.	602
Pugsley, A. T.	289, 610	Ronsdorf, L.	624
Punkari, L.	523	Rose, D. H.	450
Putnam, D. F.	605	Rosella, E.	26
Putterill, V. A.	96	Rosen, H. R.	370
Pyke, E. E.	601	Ross, A. F.	402
Quanjer, H. M.	209, 785	Rossi, F.	584
Quayle, H. J.	628	Roth, C.	482, 728
Quinn, D. G.	814	Rotter, W.	168
Raabe, A.	475	Rouzinoff, P. G.	290
Rabanus, A.	411	Rozsypal, J.	33
Rada, G. G.	315	Rozzi, G.	584
Rademacher, B.	254, 575	Rudge, E. A.	139, 542, 668
Rădulescu, E.	436, 514, 620	Rudloff, C. F.	241
Ramsbottom, J.	350	Ruehle, G. D.	692
Ramsey, G. B.	799	Ruggieri, G.	692
Rands, R. D.	94, 718	Runnels, H. A.	459, 708
Rangaswami, S.	265, 538, 802	Rupprecht, G.	313
Rao, K. A. N.	730	Russell, R. C.	748
Raphael, T. D.	451	Russell, T. A.	559
Ravaz, L.	346, 675	Russo, G.	579
Rawlins, T. E.	111, 201, 521	Ryakhovsky, N.	335
Rayner, M. C.	410	Rykoff, V. L.	117, 130
Rayss, T.	214, 471	Ryker, T. C.	737
Read, W.	644	Sagen, H. E.	288
Reckendorfer, P.	779	Sakita, S.	652
Redaelli, P.	99, 100, 169, 234, 235, 361, 362, 444, 445, 446, 582, 630, 758, 760	Sakuma, I.	657
Reddick, D.	391	Salaman, R. N.	330
Reddy, C. S.	751	Sallans, B. J.	748
Redlich, H.	813	Salmon, E. S.	423, 769, 792
Reed, G. M.	573, 574, 648	Salzmann-Danin, Z.	534
Reed, H. S.	302, 506, 628, 710	Sampson, K.	700
Reichelt, K.	670	Sands, W. N.	490
Reichert, I.	162, 506	Sandu-Ville, C.	214, 502
Reid, R. D.	464	Sanford, G. B.	117, 574, 607
Reid, W. D.	140	Sarazin, A.	490, 554, 674, 739
Reinking, O. A.	378, 708	Sarkar, B. N.	257
Reinmuth, E.	276	Sartory, A.	584, 631, 695, 697
Reiss, F.	696	Sartory, R.	584, 631, 695, 697
Reiter, K.	512	Sattar, A.	22, 156
Renn, C. E.	392, 599	Savchenkova, M.	634
		Săvulescu, T.	49, 214, 471
		Sawada, K.	532

	PAGES		PAGES
Schaal, L. A.	118	Smyth-Homewood, G. R. B.	778
Schattenberg, H.	231	Snell, K.	463
Scheffer-Boichorst	478	Snell, M. E.	645
Schenken, J. R.	235	Snyder, W. C.	71, 334, 340, 376, 486, 613
Scherbatoff, H.	469	Sokoloff, A. D.	595
Scherz, W.	285	Solunskaya, N. I.	552
Schilberszky, K.	499	Somazawa, K.	402
Schilcher, E.	500, 747	Sommer, H.	239, 637
Schilder, F. A.	285	Soukhoff, K. S.	132
Schmid, K.	237	Spencer, E. L.	474, 659
Schmidt, E. W.	417, 549, 808	Spennemann, F.	54, 650
Schmidt, M.	61, 241	Speyer, W.	677
Schnicker, J. L.	379	Spooner, E. T. C.	713
Schnitzler, O.	88	Sprague, R.	26, 230, 569, 613, 744
Schouten, A.	21	Sreenivasan, M.	477
Schroeder, F. R.	283	Sreenivasa, M.	265, 477, 802
Schultz, H.	249	Staelhein, M.	324
Schumann, K.	613	Stahel, G.	430
Schwartz, W.	633	Stakman, E. C.	30, 350, 355, 499, 503
Schwarz, F.	313	Stamer, J.	68
Scott, C. E.	191	Staniland, L. N.	676
Scurti, F.	356, 422	Stanley, W. M.	199, 260, 659, 721
Seehawer	103	Stanton, T. R.	159, 436
Sempio, C.	646, 647	Stapp, C.	37, 72, 415, 418, 525
Sengbusch, R. v.	475	Steele, G. H.	236
Senner, A. H.	460	Steenberg, F.	393
Serbinoff, V.	32	Stehlik, V.	73
Serrano, F. B.	456, 457, 643, 776	Steiner, H.	156, 729
Servazzi, O.	113, 478, 608, 656, 665	Stell, F.	13, 181
Severin, H. H. P.	171, 312	Stelzner, G.	27, 746
Shapiro, S. M.	108	Stempell, K. L.	654
Shapovalov, M.	201, 202, 404, 661	Stening, H. C.	623
Sharvelle, E. G.	355	Stevens, F. L.	532
Shaw, F. R.	33	Stevens, N. E.	160, 437, 776
Shaw, L.	110	Stevenson, J. A.	657
Shaw, R. M.	760	Steyaert, R. L.	223, 507
Shear, G. M.	616	Stirrup, H. H.	547
Sheffield, F. M. L.	51	Storck, A.	447
Shen, T. H.	295	Storey, H. H.	146, 246, 780
Shepherd, E. F. S.	84, 218	Stout, G. L.	726
Sherbakoff, C. D.	200	Stout, J. G.	800
Shibasaki, Y.	1	Stovall, W. D.	34
Shiff, M.	30	Stowe, W. P.	100
Shropshire, L. M.	662	Straib, W.	294
Shumway, C. P.	504	Streets, R. B.	115
Sibilia, C.	292, 448, 726	Stroman, G. N.	360
Siemaszko, W.	324	Stuart, L. S.	762
Simmonds, H. W.	337	Stuart, W. W.	417
Simmonds, J. H.	216, 596	Stuntz, D. E.	205
Simmonds, P. M.	748	Su, M. T.	286
Simon, M.	808	Subramaniam, L. S.	191
Singh, J.	323, 379	Suit, R. F.	415, 565
Skinner, J. J.	442	Sukhoff, K. S.	116
Slagsvold, L.	34	Summers, E. M.	123, 718
Sleeth, B.	408	Sumner, C. B.	62
Small, T.	492, 526, 637	Sutherland-Campbell, H.	235
Smart, H. F.	322	Suzuki, H.	653
Smirnova, N.	712	Sward, G. G.	520
Smith, C. L.	538	Sydow, H.	470, 793
Smith, C. O.	7, 196, 448, 566	Szembel, S. I.	23
Smith, D. C.	434, 607	Szymański, W.	526
Smith, E. C.	386, 521	Tai, F. L.	778, 795
Smith, F. E. V.	426, 792	Takahashi, N.	284
Smith, G. S.	619	Takahashi, S.	103
Smith, K. M.	246, 635, 669, 724, 763, 797	Takahashi, W. N.	201, 521
Smith, M. A.	381	Takimoto, S.	342, 547
Smith, O. F.	690	Tandon, R. N.	700
Smith, R. E.	195, 710	Tasugi, H.	568, 577, 764
Smucker, S. J.	611		

	PAGES		PAGES
Tate, H. D.	51, 810	Vanderwalle, R.	431
Taubenhaus, J. J.	304, 360, 380	Van der Weij, H. G.	473
Tavčar, A.	688	Van Everdingen, E.	715
Tavernetti, J. R.	778	Van Haltern, F.	535
Taylor, K. F.	543	Vaniné, S. I.	67, 337
Taylor, M. R. F.	513	Van Luijk, A.	240, 259
Tcherntzoff, I. A.	271, 273	Van Overbeek, J.	233
Tempány, H. A.	81	Van Poeteren, N.	11, 543
Tempel, W.	735	Van Schreven, D. A.	252, 474
Terai, T.	34	Van Vloten, H.	483
Terui, M.	8, 653	Varadaraja Iyengar, A. V.	477, 538, 783, 801
Thomas, A. V.	484	Varadhan, C.	730
Thomas, Harold E.	176	Vasey, A. J.	568
Thomas, H. Earl	176, 191, 702	Vassilievsky, A.	22
Thomas, P. H.	451	Vaughan, J. A.	205
Thomas, R. C.	503	Vears, C. K.	573
Thompson, A.	46	Venkata Rao, M. G.	204, 539
Thompson, M. A.	511, 697	Venkatarayam, S. V.	76, 693
Thomson, R.	715	Verhoeven, W. B. L.	54
Thornberry, H. H.	401, 721, 722	Vernon, T. R.	761
Thornton, H. R.	633	Verona, O.	290, 635, 765
Thorold, C. A.	226, 744	Verplancke, G.	72, 251, 342, 649
Thung, T. H.	533	Verrall, A. F.	266
Tilford, P. E.	107, 365	Viala, P.	675
Timonin, M. I.	791	Viegas, A. P.	629
Tims, E. C.	394, 459, 469	Viennot-Bourgin, F.	189
Tisdale, W. B.	85, 475, 563, 598	Viennot-Bourgin, G.	20, 645
Titus, H. W.	434	Vilkaitis, V.	750
Tobina, E.	516	Vinas, J.	739
Tochinai, Y.	653	Vincent, C. L.	191
Todd, R. L.	120	Vong-May, C.	745
Togashi, K.	1, 284	Voorhees, R. K.	232, 437
Tomkins, R. G.	321, 754		
Tompkins, C. M.	172, 207, 212, 404, 670	Wada, E.	618
Tompkins, E. H.	446	Wade, B. L.	279, 341
Tomson, R.	240	Wager, V. A.	754
Toro, R. A.	397	Wałek-Czernecka, A.	666
Toumarinson, C. S.	291, 300	Walker, J. C.	485, 486, 553, 732, 807
Townsend, G. R.	73	Walker, M. M.	479
Toxopeus, H. J.	301	Wallace, E. R.	586
Trabucchi, E.	362	Wallace, G. B.	13, 60, 678
Tranzschel, V.	291	Wallner, F.	159, 299
Trappmann, W.	380	Walter, J. M.	94
Trifonova, V.	320	Walter, M.	37, 172, 699
Trinchieri, G.	557	Walters, E. A.	84
Trotter, A.	167, 658, 773, 781, 801	Ward, G. E.	522
Tu, C.	691	Wardlaw, C. W.	45, 182, 322
Tubeuf, C. v.	536, 541, 666	Ware, W. M.	345, 423, 490, 739, 769, 792
Tullis, E. C.	119, 331, 529	Warener, J. D.	576
Tunstall, A. C.	720	Wartenberg, H.	387
Turnbull, J.	114, 369	Watanabe, N.	344
Tutin, T. G.	50	Watanabe, T.	254, 284, 512, 719
Tyler, L. J.	355, 504	Waterhouse, W. L.	618
Tysdal, H. M.	515	Waterman, R. E.	139, 276
Uhry, P.	582	Webber, I. E.	627
Ullstrup, A. J.	749	Weber, G. F.	416
Unamuno, L. M.	396	Weigert, J.	351
Uppal, B. N.	143, 198, 560, 654	Weimer, J. L.	638
Vakine, A. T.	270	Weindling, R.	163, 187, 188, 248
Valleau, W. D.	401, 402, 610	Weise, E. C.	36
Van Beyma Thoe Kingma, F. H.	471, 761	Weiss, F.	365, 586
Vandendries, R.	645	Weiss, R.	631, 695
Van der Goot, P.	152, 742	Weisz, E.	104
Van der Meer Mohr, J. C.	658	Weizel, H.	351
Van der Pijl, L.	248	Welch, D. S.	338
Van der Slikke, C. M.	527	Wellhausen, E. J.	751
		Wellman, F. L.	4, 74, 93, 112, 206, 553, 615

	PAGES		PAGES
Wells, C. O.	139	Winkelmann, A.	589, 597
Wenck, P. R.	522	Witkowski, N.	730
Wenzl, H.	771	Wolf, F. A.	367, 723, 774
Wernham, C. C.	719	Wollenweber, H. W.	585, 708
West, C.	41, 42	Wong, A.	307
West, E.	46	Wood, F. C.	555, 615
Wester, R. E.	165, 166	Wood, F. W.	633
Westerdijk, J.	664	Wood, J. I.	348, 437, 780
Weston, B. J.	691	Woodward, G. J.	105, 584, 759
Wheeler, E. J.	118	Wormald, H.	111, 367, 593, 617, 641
Whipple, O. C.	201, 404	Woronin, M.	485
White, H. E.	172	Worthley, L. H.	537
White, H. L.	636, 673	Wright, E.	205, 666, 725
White, P. R.	127		
White, R. P.	171, 173	Yakimovitch, E. D.	651
Whitehead, T.	669, 807	Yakoubtizer, M. M.	224
Wieder, L. M.	632	Yamamoto, W.	395, 471, 531, 795
Wiertelak, J.	667	Yamauti, K.	254, 275, 296, 804
Wiesmann, R.	589	Yarwood, C. E.	174
Wilcoxon, F.	244	Yen, W. Y.	59
Wild, A. S.	122	Yoshii, H.	143, 547
Wile, U. J.	444	Youden, W. J.	197, 601, 781
Wilhelm, A. F.	671	Young, H. C.	382
Williams, J. W.	510	Young, P. A.	350, 420
Williams, P. H.	635, 638	Young, V. H.	10
Williams, R. J.	105, 584, 759	Young, W. J.	36
Williams, R. R.	139, 276	Yu, T. F.	6
Willison, R. S.	594		
Wilson, A. R.	734	Zach, F.	36
Wilson, E. E.	179, 643	Zacharewicz, E.	145, 214, 420
Wilson, J. D.	142, 459, 708	Zaprometoff, N. G.	304
Wilson, M.	193	Zaumeyer, W. J.	279, 341, 669
Wilson, R. D.	733	Zekl, F.	19
Wiltshire, S. P.	461	Zeller, S. M.	65, 284
Wimmer, G.	73, 141	Ziemiecka, J.	469
Wingard, S. A.	416	Zillig, H.	557
Winge, O.	648	Zundel, G. L.	180

## GENERAL INDEX

AB dust, use of, against cereal smuts, 47.  
 Abacá, see *Musa textilis*.  
 Abavit, reaction of, with metals, 597.  
 — B, use of, against *Bacterium malva-ceilorum* on cotton, 82, 358; against *Corticium solani* on potato, 527; against *Ustilago avenae* on oats, *U. bromivora* on *Bromus unioloides*, and *U. kollerii* on oats, 572; against vegetable diseases, 277; against wheat bunt, 572.  
 — universal, use of, against cereal diseases, 20.  
*Abies*, *Mycelium radicis nigrostrigosum* on, forming mycorrhiza in Sweden, 187.  
 — *alba*, *Milesia kriegeriana*, *M. polypodii*, *M. scolopendrii*, and *M. vogesiaca* on, in England, 410.  
 — *concolor*, *Echinodontium tinctorium* on, in U.S.A., 205.  
 — — *Milesia kriegeriana*, *M. polypodii*, *M. scolopendrii*, and *M. vogesiaca* on, in England, 410.  
 — — *Trichosporium symbioticum* on, in U.S.A., 666.  
 — *grandis*, *Milesia kriegeriana* and *M. vogesiaca* on, in England, 410.  
 — — *Stereum sanguinolentum* on, in U.S.A., 728.  
 — *pectinata*, dying-off of, in Czecho-Slovakia, Europe, Germany, and Poland, 481.  
*Absidia* in soils in Europe, 655.  
*ABV-1* seed dusting apparatus, 47.  
*Acacia*, *Fomes lignosus* on, in Java, 153.  
 — *confusa*, *Ganoderma applanatum*, *G. lucidum*, and *G. rugosum* on, in Japan, 532.  
 — — *Maravalia hyalospora* and *Uromyces hyalosporus* on, in Japan, 612.  
 — *farnesiana*, *Dothiorella* on, in Italy, 680.  
 — *pendula*, *Phymatotrichum omnivorum* on, in U.S.A., 562.  
 — *robusta*, *Phylactinia acaciae* on, in S. Africa, 793.  
 — *stricta*, *Uromyctadium tepperianum* on, in New S. Wales, 134.  
*Acaulopage* predaceous on amoebae in U.S.A., 508.  
*Acer*, *Gloeosporium apocryptum* on, in U.S.A., 203.  
 — *balsamea*, *Poria subacida* on, in U.S.A., 805.  
 — *campestre*, *Phyllosticta aceris* on, in Spain, 396.  
 — — *Verticillium albo-atrum* on, in Italy, 265.  
 — *negundo*, bacterial leaf spot of, in U.S.S.R., 494.  
 — — mosaic of, in Bulgaria, 462.  
 — — *A. platanoides*, and *A. pseudoplatanoides*, *Verticillium albo-atrum* on, in Italy, 265.  
 — *rubrum*, *Nectria galligena* on, in U.S.A., 407.  
 — *saccharum*, *Poria subacida* on, in U.S.A., 805.

Acetaldehyde, use of, against grape waste, 491.  
 Acetic acid, use of, against *Aspergillus niger* on bread, 691; against *Pythium aphanidermatum* on cucumber, 7; as a soil disinfectant, 460.  
*Achorion* on man in Hungary, 104; in Morocco, 102.  
 —, regarded as a superfluous genus, 101.  
 — *caninum* on the dog in Italy, 581.  
 — *gypseum*, growth types of, in culture, 580.  
 — *indicum* on man in India, 35.  
 — *schoenleini* on man in Costa Rica, 169.  
*Achromobacter* on oil palm in Malaya, 31.  
*Acladium castellanii* on man, 308.  
*Acremoniella atra* on rice in Japan, 653.  
 — *brevis* on butter in U.S.A., 237.  
 Acropetal necrosis of potato in relation to potato streak, 251.  
*Acrostalagmus*, action of, on *Corticium solani*, 188.  
 — in butter, 761.  
 — *cinnabarinus* can infect tomato, 405.  
 — — on butter in U.S.A., 237.  
 — — on man in Hungary in relation to *Microsporon audouini*, 695.  
*Acrotheca pedrosoi*, see *Trichosporium pedrosoi*.  
*Acrothecium nigrum* on man in U.S.A., 36.  
*Actinomyces* in soil, effect of zein on, 392; occurrence in Australia, 121.  
 — on beet, 340; in Czecho-Slovakia, 73; in Europe, 548.  
 — on carrot, leek, radish, swedes, and turnip in Sweden, 340.  
 — *albus* in Italian leavens, 383.  
 — *cellulosae* on paper in France, 584, 698.  
 — *dermatonomus* on sheep in S. Africa, 236.  
 — *israeli* on man in Algeria, 168.  
 — (?) *scabies* on beet in Sweden, 340.  
 — — on potato, control, 55, 118, 150, 330, 381, 528, 716; factors affecting, 118; genetics of resistance to, 389; legislation against, in Egypt, 544; in Sweden, 672; occurrence in Holland, 528; in Mauritius, 84; in New S. Wales, 55; in Sweden, 340, 672; in U.S.A., 118, 150, 381, 389, 716; in U.S.S.R., 330; transmission of, by *Epitriz cucumeris*, 118, 716; varietal susceptibility to, 118.  
 — *totschidlowskii* on chilli in Rumania, 215.  
*Adelopus* (?) *balsamicola* on *Pseudotsuga taxifolia* var. *viridis* in Austria, 729.  
*Aecidium berberidis-thunbergii* on barberry in Japan, 796.  
 — *cantensis* on potato in S. America, 325.  
 — *lactucae-sativae* on lettuce in Rumania, 215.  
 — *paederiae*, *Puccinia zoysiae* identical with, 796.

[*Aecidium*] *valerianellae* on *Valerianella* in U.S.S.R., 292; (?) aecidial form of *Puccinia glumarum*, 292.

*Aegilops crassa* and *A. cylindrica*, *Puccinia triticina* can infect, 292.

*Aeginetia indica*, *Sclerotium rolfsii* on, in the Philippines, 315.

Aeroplanes, use of, in dusting, 18, 654.

*Agapanthus*, *Phytophthora parasitica* on, in Japan, 498.

*Agave sisalana*, see Sisal.

'Agene', see Nitrogen trichloride.

*Ageratum conyzoides* as host of the tobacco leaf curl vector in Dutch E. Indies, 533.

Agral as a constituent of shirian AG, 9.

— I as a spreader and wetter, 9.

*Agropyron*, *Puccinia rubigo-vera* on, physiologic forms of, 746.

— *cristatum*, *Helminthosporium sativum* on, in Canada, 623.

— —, *Ophiobolus graminis* on, in Canada, 622.

— *inermis*, *Cercospora herpotrichoides* and *Wojnowicia graminis* on, in U.S.A., 569.

— *repens*, *Corticium fuciforme* on, in Great Britain, 587.

— —, *Erysiphe graminis* on, resistance to, 711.

— —, *Helminthosporium sativum* on, in Canada, 623.

— —, — *tritici-repentis* on, in India, 90.

— —, *Ophiobolus graminis* on, in Canada, 622.

— —, — *herpotrichus* on, in U.S.A., 124.

— —, *Puccinia triticina* and *P. persistens* on, in France, 645.

— *riparium*, *Cercospora herpotrichoides* and *Wojnowicia graminis* on, in U.S.A., 569.

— *scabrum*, *Puccinia graminis* on, in New S. Wales, 619.

— *semicostatum*, *Puccinia agropyri* on, in Japan, 501.

— —, — *culmicola* on, in Japan, 796.

— *tenerum*, *Helminthosporium sativum* on, 623.

— —, *Ophiobolus graminis* on, in Canada, 622.

Agrosan G, effect of, on wheat germination, 558.

*Agrostis* in relation to turf diseases, 588.

—, *Rhizoctonia* on, in U.S.A., 562.

— *alba*, *Helminthosporium erythrospilum* and *H. triseptatum* on, in U.S.A., 514.

— *palustris*, *Helminthosporium erythrospilum* on, in U.S.A., 514.

— —, — *giganteum* on, in U.S.A., 515.

— *tenuis*, *Corticium fuciforme* on, in Great Britain, 587.

— —, *Helminthosporium erythrospilum* on, in U.S.A., 514.

— *vulgaris*, *Epichloe typhina* on, in Germany, 766.

—, see also Turf.

Air, fungi in, apparatus for estimation of, 589; occurrence in Arctic regions, 384, 461; in the Atlantic, 383; in British orchards, 369, 588; in the upper, in U.S.A., 326.

'Albinism' of beet in Germany, 808.

*Albizia lebbek*, *Ganoderma applanatum* and *G. lucidum* on, in Japan, 532.

Alcohol poisoning of apples in Australia, 770.

— production by moulds, 52.

—, use of, against *Ustilago tritici* on wheat, 23, 89.

— sulphates (higher) as spreading agents, 598.

Alder (*Alnus*), *Naemopspora* on, in Cyprus, 742.

—, *Septoria alni* on, in Spain, 396.

*Aleurites fordii*, bronzing of, in U.S.A., 481.

— *montana*, chlorosis and stunting of, in U.S.A., 481.

— —, *Sphaerostilbe repens* on, in Indo-China, 480.

Aleyrodid, *Aschersonia crenulata* on an, in Sierra Leone, 428.

Aleyrodidae transmitting cassava mosaic in Tanganyika, 146; tobacco leaf curl in Java, 533; (?) in Madagascar, 335.

Alkylphenols, use of, as fungicides, 707.

*Allium*, *Urocystis* on, in Cyprus, 742.

— *cepa*, see Onion.

— *porrum*, see Leeks.

— *schoenoprasum*, *Colletotrichum circinans*, *Heterosporium*, and *Puccinia porri* on, in England, 423.

Almond (*Prunus amygdalus*), *Bacterium tumefaciens* on, in Italy, 680; in U.S.A., 289; in Victoria, 111.

—, Basidiomycete on, in Italy, 680.

—, *Clasterosporium carpophilum* on, in U.S.A., 179.

— diseases, control in Morocco, 517.

—, *Gloeosporium amygdalinum* on, in Italy, 680.

—, *Glomerella cingulata* on, in Tunis, 429.

— little leaf of, in U.S.A., 176.

— mosaic in Bulgaria, 316, 368; in Czechoslovakia, England, Holland, and U.S.A., 368.

—, *Polystigma ochraceum* on, in Tunis, 429.

*Alnus*, see Alder.

*Aloysiella deformans* on *Philippia* in Madagascar, 333; *Othia deformans* synonym of, 333.

Alsike, see Clover.

*Alternaria* as a constituent of sooty moulds in New S. Wales, 60.

— in butter, 761; in U.S.A., 237.

— in eggs in France, 237.

— on apple in England, 771.

— on avocado in U.S.A., 707.

— on barley in U.S.A., 503.

— on beet in Holland, 12.

— on conifers in Canada, 409.

— on cotton in the Philippines, 755; in U.S.A., 629.

— on cumin in India, 560.

— on oats in U.S.A., 219.

— on orange in the Argentine, 15.

— on sugar-cane in U.S.A., 57.

— on timber, control, 762.

— on wheat in Algeria, 91; in New S. Wales, 623.

[*Alternaria*] stage of *Phoma hominis*, 510.  
 — *brassicae* (Berk.) Bolle on *Brassica chinensis* in the Philippines, 140.  
 — on broccoli in Canada, 494; in the Philippines, 140.  
 — on cabbage, Chinese cabbage, mustard, and radish in the Philippines, 140.  
 — on turnip in the Philippines, 140; in U.S.A., 486.  
 — *capsici-annui* on chilli in Rumania, 215.  
 — *circinans*, see *A. oleracea*.  
 — *citrin* on citrus in storage in U.S.A., 628.  
 — *cucumerina* on cucumber in Trinidad, 182.  
 — *dianthi* on carnation in U.S.A., 684.  
 — *herculea*, see *A. brassicae* (Berk.) Bolle.  
 — *humicola* on hay in U.S.A., 249.  
 — on timber in U.S.S.R., 270.  
 — *oleracea* on broccoli in Canada, 494.  
 — on cabbage in Burma, 286; in U.S.A., 340.  
 — on cauliflower in Burma, 286; in Canada, 494; in U.S.A., 340.  
 — on Chinese cabbage in U.S.A., 340.  
 — *oryzae* on rice in Japan, 633.  
 — (?) *peglionii* on wheat in Algeria, 91.  
 — *solanii* on potato, control, 649; effect of, on yield, 679; factors affecting, 565; occurrence in Belgium, 679; in Great Britain, 330; in India, 649; in U.S.A., 565; varietal susceptibility to, 330.  
 — on tomato, control, 382, 535, 563; occurrence in U.S.A., 382, 535, 563; overwintering of, 535.  
 — (?) *tabacina* on tobacco in Madagascar, 335.  
 — (?) *tenuis*, antagonism of, to *Ophiobolus graminis*, 689.  
 — can infect beet, 281.  
 — on apple in Canada, 592.  
 — on tobacco in U.S.A., 724.  
*Althaea*, see Hollyhock.  
*Aluminium*, interaction of, with fungicides, 597.  
 — sulphate, use of, against *Actinomyces scabies* on potato, 118.  
*Amaranthus*, disease resembling potato calico on, in U.S.A., 787.  
 —, *Verticillium amaranti* inhibiting germination of, 765.  
 — *retroflexus*, *Cercospora beticola* on, in U.S.A., 149.  
 — *tricolor*, *Fusarium* and *Verticillium amaranti* on, in Italy, 765.  
*Amaryllis*, tomato spotted wilt virus can infect, 404.  
 — *belladonna*, *Stagonospora curtisii* can infect, 448.  
*Ambrosia*, disease resembling potato calico on, in U.S.A., 787.  
 — *artemisiifolia*, celery virus 1 on, in U.S.A., 615.  
 —, *Sclerotium* on, in U.S.A., 221.  
 — *elatior*, celery virus 1 on, in U.S.A., 553.  
 — *trifida*, *Ophiobolus fulgidus* on, in U.S.A., 125; *Phoma* stage of, 125.  
*Ambrosiaemyces zeylanicus* on *Xyleborus* in Ceylon, 167.  
*Amelanchier*, *Bacillus amylovorus* can infect, 110.  
 —, *A. alnifolia*, and *A. canadensis*, *Gymnosporangium globosum* on, 368.  
*Ammoniacal copper carbonate*, use of, against rhododendron diseases, 174.  
*Ammoniated mercury*, use of, against mildew on paint coatings, 520.  
*Ammonium bicarbonate*, use of, against *Diplodia natalensis*, *Penicillium digitatum*, and *P. italicum* on orange, 30.  
 — carbonate, use of, against *Botrytis cinerea* on grapes, 214.  
 — chloride, use of, with Bordeaux mixture, 75.  
 — hydroxide, use of, against damping-off of ornamental plants, 684; against *Sclerotium* (?) *rolfsii* on beet, 488; in the preparation of mercury ammonium silicate dip, 173.  
 — sulphate, use of, against *Phytophthora omnivorum* on various plants, 562; against *Sclerotium* (?) *rolfsii* on beet, 488; with Bordeaux mixture, 814; with Burgundy mixture, 75.  
 —, see also Fertilizers.  
*Amoeba* and *A. sphaeronucleolus*, *Cochloneura dolichosporum* and *C. verrucosum* on, in U.S.A., 360.  
 — *terricola*, *Bdellospora helicoides*, *Endocochlus asteroides*, and *Zoopage phanera* on, in U.S.A., 360.  
 — *verrucosa*, *Dactyella tylopaga* on, in U.S.A., 508.  
*Amoebae*, *Acaulopage* and *Stylopage* on, in U.S.A., 508.  
*Amphichaeta punicae* on pomegranate in India, 379.  
*Amygdalis communis*, see Almond.  
 — *persica*, see Peach.  
*Anaberoa* disease of areca palm in India, 693.  
*Ananas comosus*, see Pineapple.  
*Anchusa gmelini* and *A. officinalis*, *Puccinia secalina* on, in U.S.S.R., 292.  
 (?) *Andropogon aciculatus*, *Balanisia* on, poisoning of cattle and goats by, in India, 630.  
 — *sorghum*, see Sorghum.  
 — *sorghum* var. *sudanensis*, see Sudan grass.  
*Anemone*, 'rust' of, in England, 676.  
 —, tomato spotted wilt on, in Western Australia, 129.  
 — *coronaria*, *Puccinia pruni-spinosae* on, in England, 676.  
 — *nemorosa*, *Ochropsora sorbi* on, in England, 492.  
*Anguillulina dipsaci* in relation to *Typhula graminum* on rye in Germany, 93.  
 — *tritici* in relation to *Dilophospora alopecuri* on cereals in Germany, 296; to *Pseudomonas tritici* on wheat in India, 571.  
*Aniline dyes*, see Dyes, aniline.  
*Antennularia scoridea* on trees and shrubs in New S. Wales, 59.  
*Anthoxanthum odoratum*, *Puccinia lolii* can infect, 435.  
*Anthracene oil*, see Oil, anthracene.

- ‘Anthraenose déformé’ of vine in France, 77.
- ‘— punctuée’ of vine in Italy, 680.
- Antibody formation in bean against *Bacillus proteus*, 78; in plants, 713. (See also Serological studies.)
- Antirrhinum*, *Phytophthora cactorum* on, in U.S.A., 195.
- , *parasitica* on, 194; in Rhodesia, 678.
- , *glutinosum*, *Puccinia antirrhini* on, in England, 446.
- , *majus*, celery virus I on, in U.S.A., 615.
- , *Fusarium* on, in S. Africa, 238.
- , *Phytophthora cactorum* on, in S. Africa, 238; *P. pini* var. *antirrhini* synonym of, 238.
- , *Puccinia antirrhini* on, breeding against, 172, 498; control, 239, 240; factors affecting, 747; notes on, 239, 560; occurrence in Bermuda, 239, 560; in Denmark, 239; in England, 239, 446; in France, 239, 645; in Germany, 239, 364; (?) in Holland, 12; in U.S.A., 172, 239, 498; varietal resistance to, 364, 498.
- , *Pythium ultimum* on, in U.S.A., 383.
- , tomato spotted wilt can infect, 212.
- , virus of *Petunia hybrida* can infect, 560.
- , *molle*, *Puccinia antirrhini* on, in England, 446.
- , *orontium*, *Puccinia antirrhini* on, in France, 364.
- Anuraphis padi*, transmission of plum mosaic by, 368.
- Aphanomyces* on peas in Tasmania, 425.
- , (?) *cladogamus* on flax and spinach in U.S.A., 417.
- , *euteiches* on peas in France, 286; in U.S.A., 151.
- , *levius* on beet in Europe, 548; in Holland, 209.
- Aphids, transmission of cabbage mosaic by, 415; of celery mosaic by, 498; of onion yellow dwarf by, in U.S.A., 51.
- Aphis abbreviata*, transmission of potato viruses by, 496.
- , *fabae*, transmission of beet ‘virus yellows’ by, 548.
- , *gossypii*, transmission of celery mosaic by, 498; of celery virus I by, in U.S.A., 4, 93, 112, 554; of vegetable marrow mosaic by, 489.
- , *laburni*, transmission of groundnut mosaic by, 739.
- , *maydis*, transmission of celery virus I by, in U.S.A., 112; of sugar-cane mosaic by, in the Dutch E. Indies, 743.
- , *runicis*, transmission of broad bean mosaic by, 4; of onion yellow dwarf by, in U.S.A., 51; of tobacco virus I (tomato fern-leaf mosaic) by, 132.
- Apios tuberosa*, (?) *Rhizoctonia microsclerotia* on, in U.S.A., 417.
- Apium goughense*, *Puccinia goughensis* and *Septoria apicicola* (*S. apii*) on, in Gough Island (Antarctic), 258.
- [*Apium*] *graveolens*, see Celery.
- Aplanobacter insidiosum* on lucerne, breeding against, 149, 174, 515; method of infection by, 109; note on, 682; occurrence in U.S.A., 109, 149, 174, 222, 515, 638, 682; studies on, 174, 515, 638; varietal resistance to, 149, 222.
- , *michiganense* on *Lycopersicum pimpinellifolium*, resistance to, 682.
- , on tomato, control, 535, 610, 682; factors affecting, 681; losses caused by, 681; note on, 151; occurrence in New S. Wales, 348, 610; in U.S.A., 151, 535, 681; study on, 681; varietal resistance to, 682.
- , *stewarti* can infect *Setaria glauca*, sorghum, and Sudan grass, 354.
- , on *Euchlaena mexicana* in U.S.A., 733.
- , on maize, bacteriophage in relation to, 503; factors affecting, 160, 348; genetics of resistance to, 751, 752; note on, 562; occurrence in U.S.A., 94, 151, 160, 348, 496, 503, 562, 752; overwintering of, in *Chaetocnema pulicaria*, 94, 753; study on, 160; varietal resistance to, 151, 354.
- Apoplexy of apricot in Rumania, 215.
- of vine in Cyprus, 347.
- Apparatus for catching wind-borne spores, 49; for experimental dusting of sulphur in controlled amounts, 598; for regulating spray pressure, 708. (See also Dusting, Seed disinfection, and Spraying apparatus.)
- Apple (*Pyrus malus*), alcohol poisoning of, in Australia, 770; difference of, from scald, 770.
- , *Alternaria* on, in England, 771.
- , *tenuis* on, in Canada, 592.
- , *Bacillus amylovorus* on, control, 221; dissemination of, by bees, 318; factors affecting, 110, 148, 370; method of infection by, 370; occurrence in Canada, 221; in U.S.A., 110, 148, 221, 318, 370; study on, 110; varietal resistance to, 110; viability of, 221.
- , *Bacterium* on, in U.S.A., 319.
- , *rhizogenes* on, control, 452; factors affecting, 369; occurrence in U.S.A., 288, 289, 452.
- , *tumefaciens* on, control, 499; occurrence in Germany, 740; in Hungary, 499; in U.S.S.R., 493; viability of, 740.
- , bitter pit, bibliography of, 369; control, 369; (?) due to a virus, 242, 316, 639; (?) early record of, in England, 462; occurrence of, in Bulgaria, 639; in Denmark, 558; in U.S.A., 592; synonymy of, 242.
- , black pox of, see *Helminthosporium papulosum* on.
- , blotchy core of, in Australia, 520.
- , boron deficiency of, in relation to internal cork in New Zealand, 770.
- , *Botrytis cinerea* on, in England, 40; in U.S.A., 287.
- , brown heart of, in Australia, 770; in U.S.A., 592.
- , *Ceratostomella catoniana* on, see *Ophiostoma catonianum* on.

[Apple], *Ciboria aestivalis* on, in New S. Wales, 704.  
 —, *Cladosporium nodulosum* on stored, in Italy, 373.  
 —, *Coniothecium chomatosporum* on, in England, 617.  
 —, *Coniothyrium* on, in Canada, 44, 177.  
 —, cork of, in Tasmania, 242; in U.S.A., 592.  
 —, corky-pit of, see internal cork of.  
 —, *Corticium centrifugum* on, in Northern Ireland, 701.  
 —, — *salmonicolor* on, in Ceylon, 146.  
 —, crinkle in Tasmania, 242; in U.S.A., 592.  
 —, *Cytospora microspora* on, in Italy, 450.  
 —, *Cytosporina ludibunda* on, factors affecting, 40, 453.  
 —, degeneration of, in Italy, 317.  
 —, *Diaporthe perniciosa* on, in England, 771.  
 —, *Diplodia mutila* on, in Jersey, 423.  
 —, diseases, control, 701; in Hungary, 773; in Morocco, 517; in U.S.A., 788; occurrence in markets in U.S.A., 450.  
 —, drought spot of, in U.S.A., 592.  
 —, *Elsinoe piri* on, in the Argentine, 223; from Switzerland, 815.  
 —, freezing injury of stored, in U.S.A., 592.  
 —, fungal wastage of, breakdown in relation to, 41; control, 450.  
 —, *Fusarium* on, in Canada, 592.  
 —, — *lateritium* var. *fructigenum* on, in England, 40.  
 —, — *solani* can infect, 472.  
 —, *Gibberella moniliformis* can infect, 242, 472.  
 —, *Gloeodes pomigena* on, in S. Africa, 452.  
 —, *Gloesporium album* on, in England, 771.  
 —, *Glomerella cingulata* on, in the Argentine, 40; in U.S.A., 452.  
 —, — *rubicola* can infect, 378.  
 —, *Gymnosporangium globosum* on, in U.S.A., 368.  
 —, — *juniperi-virginianae* on, control, 684; occurrence in U.S.A., 150, 684, 771; study on, 369; varietal resistance to, 150, 369, 771.  
 —, heat crinkle of, in Australia, 520.  
 —, *Helminthosporium papulosum* on, in U.S.A., 349, 372.  
 —, injury caused by factory fumes in Italy, 680.  
 —, internal bark necrosis of, in U.S.A., 372.  
 —, — browning of, in U.S.A., 770.  
 —, — cork of, in New Zealand, 592, 770.  
 —, Jonathan spot of, in U.S.A., 592.  
 —, *Lambertella corni-maris* on, (?) identical with *Phaeosclerotinia nipponica*, 451; occurrence in Germany, 451.  
 —, *Leptothyrium pomi* on, in S. Africa, 452.  
 —, little leaf of, control, 176, 767; 'corral spot sickness' may be identical with, 767; factors affecting, 449; occurrence in S. Africa, 42; in U.S.A., 176, 449, 767, 768.

[Apple], low temperature breakdown of, control, 41; factors affecting, 41, 42, 243, 592; occurrence in England, 41, 42; in U.S.A., 41, 243, 592, 770; studies on, 41, 243; soft scald identical with, 770.  
 —, mealy breakdown of, in U.S.A., 592.  
 —, measles in New S. Wales, 348; in U.S.A., 349, 372; types of, 349, 372.  
 —, mosaic in Bulgaria, 316, 639; transmissible to damson, 639; pear, 316, 639; quince, 639; rose, 316.  
 —, moulds on, control of, 450.  
 —, mouldy core in Canada, 591.  
 —, *Mycosphaerella pomi* on, in U.S.A., 151.  
 —, *Neckria galligena* on, in England, 617.  
 —, *Ophiostoma catonianum* on, in Italy, 374, 702.  
 —, *Penicillium* on, in Italy, 373.  
 —, — *expansum* on, in England, 40; in Italy, 373; in U.S.A., 287, 592; varietal resistance to, 373.  
 —, — *italicum* and *P. olivino-viride* on, in Italy, 373.  
 —, *Phaeosclerotinia nipponica* on, in Japan, 451; *Lambertella corni-maris* may be identical with, 451.  
 —, *Phomopsis coneglanensis* on, virulence of, 40.  
 —, *Physalospora obtusa* on, (?) in Bulgaria, 316; in Peru, 315; in U.S.A., 371.  
 —, — *piricola* can infect, 640.  
 —, *Phytophthora* can infect, 147.  
 —, — *cactorum* on, in U.S.A., 371.  
 —, *Podosphaera leucotricha* on, control, 9, 315, 771, 773; nature of resistance to, 711; note on, 316; occurrence (?) in England, 9; in Finland, 771; in Hungary, 639, 773; in Peru, 315; in Western Australia, 315; varietal resistance to, 639.  
 —, *Pseudomonas papulans* on, in U.S.A., 319.  
 —, *Rosellinia necatrix* on, in U.S.A., 176.  
 —, scald, control, 42, 770; differentiation of alcohol poisoning from, 770; factors affecting, 42; occurrence in Australia, 769; in England, 42; in U.S.A., 592; studies on, 42, 769; types of, 769. (See also soft scald of.)  
 —, *Schizophyllum commune* on, in New S. Wales, 348.  
 —, *Sclerotinia fructigena* on, in England, 40; in Italy, 703.  
 —, (?) — *laza* on, in U.S.A., 449.  
 —, soft scald of, in U.S.A., 41, 770; soggy [low temperature] breakdown identical with, 770.  
 —, soggy breakdown of, see low temperature breakdown of.  
 —, *Sphaeropsis* on, in England, 40.  
 —, *Trichothecium roseum* on, in England, 40.  
 —, *Venturia inaequalis* on, ascospore discharge of, 496, 589, 590; breeding against, 241; control, 111, 148, 150, 218, 242, 371, 381, 382, 452, 495, 496, 517, 562, 589, 590, 677, 683, 700, 769; development of, in storage, 111; dis-

semination of, 50, 589; factors affecting, 317, 590; legislation against, in England, 336, 672; losses caused by, 241; notes on, 316; occurrence in the Argentine, 371; in Bulgaria, 50; in Canada, 495; in England, 111, 242, 590, 672, 769; in Germany, 241, 316, 317, 371, 517, 589, 677, 700; in Holland, 13, 40; in Peru, 315; in Scotland, 769; in Switzerland, 589; in U.S.A., 148, 150, 218, 381, 382, 452, 496, 562, 590, 683; overwintering of, 40; physiologic specialization in, 242, 316; specific and varietal susceptibility to, 111, 241; studies on, 111, 241.

[Apple], water-core of, control, 520; factors affecting, 520, 701; occurrence in Australia, 520; in U.S.A., 592, 701; relation of, to crinkle, 242; study on, 701.

—, — breakdown of, in Australia, 243; types of, 243. (See also crinkle.)

—, *Xylaria mali* on, in U.S.A., 373.

—, York 'pot of, in U.S.A., 592.

—, orchards, fungi in air of, in Bulgaria, 50; in England and Northern Ireland, 369; in Switzerland, 590.

Apricot (*Prunus armeniaca*) apoplexy in Rumania, 215.

—, *Ciboria aestivalis* on, in New S. Wales, 704.

—, *Cytospora rubescens* on, in Italy, 450.

—, diseases, control in Morocco, 517.

—, gummosis in S. Australia, 559.

—, *Lambertia corni-maris* on, in New S. Wales, 774.

—, leptonecrosis in Italy, 455.

—, little leaf of, control, 176, 768; occurrence in S. Africa, 42; in U.S.A., 176, 768.

—, mosaic in Bulgaria, 316, 368; in Czechoslovakia, England, Holland, and U.S.A., 368; transmission of, to plum, 368.

—, physiological disease of, in Egypt, 177.

—, *Rosellinia necatrix* on, in U.S.A., 177.

—, *Sclerotinia fructicola* on, in Australia, 704.

—, — *laxa* on, in Tasmania, 703.

—, — *sclerotiorum* on, in Western Australia, 315.

*Aquilegia vulgaris*, tomato spotted wilt on, in Western Australia, 129.

*Arabis albida*, *Phoma lingam* can infect, 547.

—, *hirsuta*, *Cystopus candidus* var. *microspora* on, in Japan, 2.

*Arachis glabrata*, *Cercospora personata* on, in Brazil, 212.

—, *hypogaea*, see Groundnut.

—, *marginata*, *A. pusilla*, *A. rasteiro*, *A. tuberosa*, and *A. villosa*, *Cercospora personata* on, in Brazil, 212.

*Arbutus menziesii*, *Cryptostictis arbuti* on, in U.S.A., 66.

—, *Mycosphaerella arbuticola* on, in U.S.A., 65.

*Arctium* mosaic in U.S.S.R., 108.

—, *lappa*, *Cercosporina lappae* on, in Japan, 284.

*Arctostaphylos*, *Exobasidium vaccinii* on, in U.S.A., 65.

[*Arctostaphylos*] *columbiana*, *Cryptostictis arbuti* and *Exobasidium vaccinii-uliginosum* on, in U.S.A., 66.

*Ardisia*, bacterial leaf nodules of, 154.

*Areca* palm (*Areca catechu*), anaberoga disease of, in India, 693.

—, *Ustulina zonata* on, in Ceylon, 146.

—, (?) virus disease of, in Ceylon, 145.

*Armillaria* on *Trema guineensis* and other forest trees in Tanganyika, 678.

—, *fuscipes*, luminosity of, 86.

—, *matsutake* on pine, forming mycorrhiza in Japan, 284.

—, *mellea*, control, 366, 451, 618, 677, 707.

—, differentiation of, from *Clitocybe tabescens*, 86.

—, enzymes of, 266.

—, luminosity of, 86.

—, on avocado in U.S.A., 707.

—, on cacao in the British Empire, 87.

—, on citrus in Malta, 618.

—, on conifers in Great Britain, 803.

—, on forest trees in Poland, 663.

—, on fruit trees in Germany, 677; in Tasmania, 451.

—, on larch in Great Britain, 804.

—, on narcissus in England, 366.

—, on *Parinarium mobola* in Nyasaland, 14.

—, on pigeon pea in Nyasaland, 14.

—, on pine and spruce in Great Britain, 803.

—, on tea in Nyasaland, 14.

—, on timber in U.S.A., 266.

—, *Trichoderma lignorum* can parasitize, 249.

—, *ponderosa* on pine in U.S.A., 285.

*Aronia*, *Bacillus amylovorus* can infect, 110.

Arsenic a constituent of nosprasis O, 701; of talc-arsin, 22.

—, compounds, methylation of, by moulds, 783.

—, use of, as fungicides, 244; in eradication of spiked sandal, 539; in timber preservatives, 138, 337.

—, fumes, toxicity of, to German forest trees, 725.

*Artemisia vulgaris*, *Erysiphe artemisiae* on, in Estonia, 530.

Artichoke (*Cynara scolymus*), *Cercospora grandissima* on, in Brazil, 87.

*Articularia quercina* var. *minor* on pecan in U.S.A., 408.

*Articularia aurantiaca*, *Fusisporium album*, *Helostroma album*, and *Microstroma album* synonyms of, 408.

*Artocarpus integrifolia*, *Phomopsis artocarpi* on, in India, 470.

Arum lily, see *Zantedeschia aethiopica*.

*Arundinaria*, see Bamboo.

*Asbolisia* as a constituent of sooty moulds in New S. Wales, 60.

—, *ampullula* referred to *Cicinnobella ampullula*, 793.

*Aschersonia caespitica* (?) imperfect stage of *Hypocrella amomi*, 443.

—, *crenulata* on an Aleyrodid in Sierra Leone, 428.

*Ascochyta* as a stage of *Septoria* and

*Stagonospora*, 194; of *Septoria gladioli*, 193.

[*Ascochyta*] on peas, control, 429; factors affecting, 428; notes on, 428, 683; occurrence in U.S.A., 219, 428, 683.

— on vetch in U.S.A., 428, 683.

— *batatae* and *A. bataticola* on sweet potato in U.S.S.R., 652.

— *boehmeriae* can infect *Boehmeria japonica* var. *platanifolia*, *B. platyphylla*, *B. tricuspis*, and *Villebrunea frutescens* var. *concolor*, 512.

— — on *Boehmeria nivea* in Japan, 512.

— *boltshauseri* can infect *Phaseolus angularis*, *P. aureus*, and *P. coccineus*, 614.

— — on bean in U.S.A., 613; synonymy of, 614.

— *caricae* on papaw in Queensland, 216.

— *eribotryae* on loquat in Italy, 777.

— *gossypii* on cotton (?) in the Sudan, 756; in U.S.A., 629.

— *juglandis* on walnut in Germany, 204.

— *lethalis* on *Melilotus officinalis* in U.S.A., 258.

— *pinodella* can infect *Phaseolus aconitifolius* and *P. aureus*, 614.

— — on peas, notes on, 547, 613; occurrence in Japan, 547; in U.S.A., 614.

— *pisi* can infect *Phaseolus aconitifolius* and *P. aureus*, 614.

— —, comparison of, with *A. boltshauseri*, 614.

— —, effect of radiations of metals on, 646.

— — on peas, notes on, 547, 613; occurrence in the Argentine, 15; in Japan, 547; in U.S.A., 71, 614.

— *rabiei* on *Cicer arietinum* in Rumania, 215.

— *viciae* on vetch in Europe and U.S.A., 219.

*Ascotricha chartarum* var. *orientalis* on man in China, 308.

'Ascu' process of timber preservation, 337.

Ash (*Fraxinus*), *Cytospora annularis* on, in U.S.A., 221.

—, *Dothiorella fraxinicola* can infect, 221.

— mosaic in Bulgaria, 462.

—, *Phytophthora omnivorum* on, in U.S.A., 562.

—, *Poria subacida* on, in U.S.A., 805.

Asparagus diseases in England, 414.

—, *Fusarium culmorum* on, in Germany, 735.

—, *Helicobasidium purpureum* on, in England, 730.

—, *Puccinia asparagi* on, control, 489, 554, 811; losses caused by, 489; notes on, 811; occurrence in Germany, 489, 554, 811.

Aspen (*Populus tremula*), *Diplodia gongronae* on, in Austria, 134.

*Aspergillus*, decomposition of cellulose by, 584; of hemicelluloses by, 55; of pentosans by, 604.

— in butter in U.S.A., 237.

— in soil in Canada, 791.

— in the upper air in U.S.A., 326.

— on fruit in storage in U.S.A., 322.

[*Aspergillus*] on maize in U.S.A., 232.

— on man in Japan, 510.

— on soy-bean cakes in Japan, 671.

— on strawberry in U.S.A., 682.

— on vegetables in storage in U.S.A., 322.

— on wheat in U.S.S.R., 298.

—, production of organic acids by, 604.

—, taxonomy of, 334, 796.

— *amstelodami* on soy-bean cakes in Japan, 671.

— *calyphratus* var. *italicus* in Italian leavens, 383.

— *candidus* on cotton textiles, 585.

— on man in China, 633.

— *cellulosae* in soil in Japan, 332.

— *clavatus* on hay in U.S.A., 249.

— *fischeri*, fat and ergosterol production by, 522.

— *flavus* in pharmaceutical preparations in Denmark, 114.

— — on hay in U.S.A., 249.

— — on maize in U.S.A., 355.

— — on tobacco in Rhodesia, 678.

— —, production of fat from glucose by, 522.

— *flavus-oryzae* on leather, production of lipolytic and depilating enzymes by, 762.

— *fuliginosus*, saltation in, 334.

— *fumigatus* in pharmaceutical preparations in Denmark, 114.

— — in soil in Japan, 332.

— — on cattle in U.S.A., 511.

— — on hay in U.S.A., 249.

— — var. *cellulosae* on paper in France, 584, 697.

— *glaucus* in butter, 761.

— — in pharmaceutical preparations in Denmark, 114.

— — on cotton textiles, 585.

— —, physiological polarity and variation in, 522.

— *hennebergi*, description of, 796.

— *herbariorum* var. *major* on textiles, 585.

— — var. *minor* on soy-bean cakes in Japan, 671.

— *japonicus* and *A. malvaceus*, saltation in, 334.

— *nidulans*, longevity of, 648.

— — and its vars. *imminutus* and *fertilior*, physiological polarity and variation in, 523.

— *niger*, antagonism of, to certain fungi, 387; to *Corticium solani*, 188.

— — in butter in U.S.A., 237.

— — in Italian leavens, 383.

— — in pharmaceutical preparations in Denmark, 114.

— — on bread, 691.

— — on cattle in U.S.A., 511.

— — on cotton in U.S.A., 629.

— — on cotton textiles, 585.

— — on hay in U.S.A., 249.

— — on onion, 553.

— —, production of citric acid by, 603, 604; of organic acids by, 604.

— —, taxonomy of, 796.

— —, toxicity of aniline dyes to, 105, 115; of phenolic compounds to, 553.

— *oryzae*, decomposition of cellulose by, 332.

[*Aspergillus oryzae*] in soil in Japan, 332.  
 —, production of taka-diastase by, 603;  
 of organic acids by, 604.  
 —, viability of, 648, 784.  
 — *repens* on soy-bean cakes in Japan, 671.  
 — on wheat in Algeria, 92.  
 — *sulphureus* on tobacco in Rhodesia, 678.  
 — *tamarii* on maize in U.S.A., 355.  
 — *terreus* on hay in U.S.A., 249.  
 — *unguis* on man in Costa Rica, 169.  
 — *versicolor* on cotton textiles, 585.  
 — *wentii*, saltation in, 334.  
*Asperisporium caricae* on papaw in U.S.A., 46.  
*Aspidiotus perniciosus*, *Myriangium duri-aei* and *Peziotrichum saccardinum* on, in the Argentine, 98.  
*Aspidium aculeatum* var. *lobatum*, *A. filix-mas*, *A. spinulosum*, and *Asplenium trichomanes*, *Corticium anceps* on, 797.  
*Asporomyces*, a genus of the Torulopsoideae, 193.  
*Aster*, China (*Callistephus chinensis*), *Bacillus asteris* on, in Italy, 635.  
 —, —, carrot can infect, 312.  
 —, —, celery yellows can infect, 313.  
 —, —, *Coleosporium solidaginis* on, in U.S.A., 364.  
 —, —, *Fusarium* on, in Germany, 172.  
 —, —, — *oxysporum* on, in Germany, 447.  
 —, —, tomato spotted wilt on, in U.S.A., 201; in Western Australia, 129.  
 —, —, *Verticillium albo-atrum* on, in Germany, 447.  
 —, —, yellows of, in U.S.A., 171, 312, 313; transmission of, by *Cicadula sexnotata*, 171, 312, 313; by *Thamnotettix montanus*, 313; to carrot, 312; to celery, 171, 312, 313; to potato, 312; virus of, affecting *Eschscholzia californica*, *Godezia grandiflora*, and *Tagetes erecta*, in U.S.A., 171.  
*Aster rotundifolius*, *Erysiphe cichoracearum* on, in U.S.A., 240.  
*Asterinella hiugensis* on bamboo in Japan, 107.  
*Asteroecystis radicis* on cucumber in Germany, 212.  
 — on flax in U.S.A., 362.  
 — on grass in Holland, 12.  
*Astragalus sinicus* (?) a host of rice dwarf virus in Japan, 469.  
*Atchia glomerulosa* as a constituent of sooty moulds in New S. Wales, 59.  
 'Atlas' arsenical tree-killer, 539.  
*Atropa belladonna*, 'woodiness' of, in U.S.S.R., 131.  
*Atropellis pinicola* on pine in U.S.A., 540.  
*Aucuba* mosaic of cucumber attributed to cucumber virus 4 (q.v.), 554.  
 — of potato, anatomical differentiation of, 116; effect of, on physiology of host, 52; occurrence in U.S.S.R., 52, 116; serological differentiation of, 385.  
 — of tobacco in U.S.A., 197, 280; properties of virus of, 260, 401; serological studies on, 197, 385; transmis-  
 sion of, to *Zinnia elegans*, 812; varietal susceptibility to, 401.  
[i>Aucuba mosaic] of tomato, see Tobacco virus 6 on tomato.  
 AV, use of, against *Bacterium malvacearum* on cotton, 33.  
*Avena* spp., see Oats.  
*Avocado* pear (*Persea gratissima*), *Alternaria* on, in U.S.A., 707.  
 —, —, *Armillaria mellea* on, in U.S.A., 707.  
 —, —, bacterial disease of, in Tanganyika, 679.  
 —, —, *Botryosphaeria ribis* var. *chromogena* on, in U.S.A., 196, 707.  
 —, —, *Botrytis cinerea* on, in Sierra Leone, 428.  
 —, —, *Cladosporium* and *Colletotrichum gloeosporioides* on, in U.S.A., 707.  
 —, —, fruit scab of, caused by *Helopeltis bergrothi* in Nyasaland, 561.  
 —, —, *Fusarium* and *Helminthosporium* on, in U.S.A., 707.  
 —, —, *Melanops perseae* on, in S. Africa, 124; *Physalospora perseae* renamed, 124.  
 —, —, *Penicillium expansum*, *Pestalozzia*, *Phytophthora* (?) *cactorum*, *P. citrophthora*, *P.* (?) *parasitica*, *Pseudomonas syringae*, and *Rhizopus nigricans* on, in U.S.A., 707.  
 —, —, *Sphaceloma perseae* on, in Brazil, Cuba, Porto Rico, (?) Rhodesia, and U.S.A., 459.  
 —, —, sun blotch of, in U.S.A., 707.  
*Azalea*, see Rhododendron.  
 B88 dust, use of, against *Calonectria graminicola* on rye, 21.  
 B110 and B111, use of, against wheat bunt, 21.  
*Bacillus* on peas in England, 280.  
 (?) — symbiont of *Pseudococcus brevipes* in relation to green spotting of pineapple in Hawaii, 379.  
 — *aerogenes*, inactivation of the tobacco mosaic virus by, 403.  
 — *amylavorus* can infect *Amelanchier*, 110; *Aronia*, *Cotoneaster*, *Crataegus*, and *Pyrus*, 110.  
 —, —, dissemination of, by bees in U.S.A., 318, 370.  
 —, —, filtrability of, 744.  
 —, —, on apple, control, 221; factors affecting, 110, 148, 370; method of infection by, 370; occurrence in Canada, 221; in U.S.A., 110, 148, 221, 318, 370; study on, 110; varietal resistance to, 110; viability of, 221.  
 —, —, on fruit trees, legislation against, in Australia, 64.  
 —, —, on loquat in Italy, 778.  
 —, —, on pear, breeding against, 318; control, 221, 318, 497; method of infection by, 370; occurrence in Canada, 221; in U.S.A., 221, 318, 370, 497; varietal resistance to, 318; viability of, 221.  
 —, —, on quince in U.S.A., 370.  
 —, —, on Rosaceae in U.S.A., 702.  
 — *ananas* on pineapple, as the cause of fruitlet black rot (q.v.), 182, 456; occur-

rence in Guatemala, 182; in Hawaii, 456; in the Philippines, 456, 776.

[*Bacillus*] *apiovorus* synonym of *B. carotovorus*, 142.

— *aroideae* on tobacco in Sumatra, 473.

— *asteris* on China aster in Italy, 635.

— *avenae* on oats in U.S.A., 219.

— *carotovorus*, filtrability of, 774.

— — on celery, note on, 343; occurrence in Canada, 343; in England, 730; in Italy, 142; in U.S.A., 343; study on, 142; synonymy of, 143.

(?) — — on *Foeniculum vulgare* in Italy, 681.

— — on iris in England, 698.

— — on swedes in Wales, 808.

— — on tobacco in Italy, 658.

— —, serological reaction of crown gall juice with, 430.

— *coli*, action of, on *Ophiobolus graminis* on wheat, 689.

— —, bacteriophage of, 290.

— *dysenteriae*, bacteriophage of, 290.

— *fluorescens* and *B. fluorescens putridus*, comparison of, with allied species, 16.

— *mesentericus* group on oil palm in Malaya, 31.

— *vulgaris* on orange in Italy, 356.

— *phytophthora* on potato in Germany, 525.

— — on tobacco in Italy, 658.

— *prodigiosus* as an indicator of efficiency of filters, 722.

— — on bean, antibody formation against, 713.

— — on *Tenebrio molitor*, antagonism between *Beauveria bassiana* and, 361.

— *proteus*, antibody formation against, in beans, 78, 713; in lentils, 713.

— —, inactivation of tobacco mosaic virus by, 403.

— *vulgaris* can infect tomato, 405.

— *pyocyanus* can infect tomato, 405.

— —, comparative study on, 16.

— — on sugar-cane in India, 395.

— *radicicola*, bacteriophage of, 290, 744; relation of, to lucerne failure, 744.

— —, comparison of, with *Bacterium rhizogenes* and *Bact. tumefaciens*, 288, 289.

— — on lucerne in France, 744.

— *tracheiphilus* on squash in U.S.A., 684.

Bacteria, antagonism of, to certain fungi, 387; of *Penicillium* to, 464.

— in eggs in France, 237.

— in the upper air in U.S.A., 326.

— on stored fruits and vegetables in U.S.A., 322.

— on wheat grain in storage in U.S.S.R., 297.

— on yams in Nigeria, 217.

Bacterial bud rot of oil palm in Malaya, 357.

(?) — canker of hops in U.S.A., 607.

(?) — — of plum in England, 617.

— content of butter as a measure of creamery sanitation, 633.

— discoloration of barley grain in U.S.A., 503.

— disease of avocado in Tanganyika, 679.

[Bacterial disease] of *Brachartona cataphantha* in Java, 152.

(?) — — of cottonwood in U.S.A., 409.

(?) — — of *Platanus* in U.S.A., 409.

— diseases of flax in U.S.S.R., 634.

— — of pineapple in Queensland, 216.

— — of pentosans, 604.

— leafnodules of coffee and Rubiaceae, 154.

— — spot of *Acer negundo* in U.S.S.R., 494.

— red rot of cotton bolls in the Belgium Congo, 223.

— rot of sugar-cane in India, 395.

— — of wheat in Algeria, 91.

— staining of cotton in S. Africa, 97.

— wet rot of potato, legislation against, in Sweden, 672.

(?) — wilt of banana in Mauritius, 84.

Bacteriophage, comparison of, with plant viruses, 185.

— of *Aplanobacter stewarti*, 503; of *Bacillus coli*, 290; of *B. dysenteriae*, 290; of *B. radicicola*, 290, 744; of *Bacterium malvacearum*, 744, 757; of *Bact. solanacearum*, 686; of *Bact. tabacum*, 154, 744; of *Bact. tumefaciens*, 744.

— varieties of, 186.

*Bacterium* on apple and plum in U.S.A., can infect peach, 319.

— on sweet peas in U.S.A., causing fasciation, 365.

— *albilineans* on sugar-cane, control, 530, 531; factors affecting, 531; occurrence in Hawaii, 530, 531; in Java, 743; in Queensland, 333; transmission of, by cuttings and knives, 531; varietal susceptibility to, 333, 743.

— *alfalfa*, see *Pseudomonas alfalfa*.

— *ananas* on pineapple, distinct from *Bacillus ananas*, 456; occurrence in the Philippines, 456, 776.

— *angulatum* on tobacco, comparison of, with allied species, 16; control, 200; factors affecting, 85, 403; occurrence in Rhodesia, 200; in U.S.A., 85, 335, 403, 724; transmission of, by *Protoparce sexta*, 335.

— *apii* identical with *Bacillus carotovorus*, 143.

— (?) *atrofaciens* on rye in U.S.S.R., 297.

— (?) — on wheat in U.S.S.R., 297.

— *begoniae* on begonia in Japan, 498.

— *beticola* on beet, 686.

— *briosii* on tomato not the cause of apical rot in Italy, 405.

— *bulgaricum* in yoghurt in Java, 328.

— *cacticorum* on *Cereus senilis* in Italy, 765.

— *flaccumfaciens* on bean in U.S.A., 565.

— —, serological reaction of crown gall juice with, 430.

— *fluorescens* on pear, pathogenicity of, 16.

— *formosanum* can infect *Brassica chinensis*, *B. pekinensis*, beet, cabbage, *Calendula officinalis*, carrot, *Chrysanthemum coronarium*, cucumber, lettuce, onion, potato, radish, tobacco, tomato, and turnip, 738.

— — on chicory in Japan, 738.

(?) — *herbicolae aureum* on peas in England, 280.

— *helianthi* on sunflower in Japan, 314.

[*Bacterium*] *holci* on maize, 16.  
 — — synonym of *Pseudomonas cerasi*, 16.  
 (?) — *holcicola* on sorghum in U.S.A., 562.  
 — *jaggeri* distinct from *Bacillus carotovorus*, 142.  
 — — on celery, 16.  
 — *juglandis* on walnut in Australia, Holland, New Zealand, and Switzerland, 204; in U.S.A., 204, 477.  
 — — on *Corylus avellana* and *C. colurna* in U.S.A., 204.  
 — *lacrymans* on cucumber, 16.  
 — —, serological study on, 418.  
 — *lactucae* on lettuce in Japan, 498.  
 — *maculicola* on tobacco in Italy, 658.  
 — *malvacearum*, bacteriophage of, 744, 757.  
 — — on cotton, breeding against, 164, 358; control, 32, 82, 221, 304, 562, 629, 757; effect of, on yield, 32; factors affecting, 82, 757; notes on, 96, 97, 757; occurrence in the Belgian Congo, 223; in the Philippines, 755; in St. Vincent, 164; in the Sudan, 96, 358, 757; in Uganda, 82, 97, 358; in U.S.A., 221, 562, 629; in U.S.S.R., 32, 304; study on, 32; varietal resistance to, 32, 82, 97, 164, 223, 304, 358.  
 — —, serological note on, 430.  
 — *marginale* on lettuce, 16.  
 — *marginatum* on gladiolus in U.S.A., 173, 498.  
 — *medicaginis* on bean in New Zealand, 140.  
 — — var. *phaseolicola* on bean, comparison of, with allied species, 16; control, 72; detection of seed infection by, 733; factors affecting, 565; occurrence in Australia, 289; in France, 286; in Germany, 72, 415; in New S. Wales, 733; in U.S.A., 565; variation in, 289; varietal resistance to, 72, 286, 415.  
 — — — on *Pueraria hirsuta*, 16.  
 — *melleum* on tobacco in Italy, 659.  
 — *mori*, serological reaction of crown gall juice with, 430.  
 — *nectarophilum* on pear in Natal, 453.  
 — *phaseoli* on bean, control, 341, 415; factors affecting, 415, 565; occurrence in Bermuda, 560; in Bulgaria, 341; in Canada, 415; in U.S.A., 565; varietal susceptibility to, 341, 415.  
 — — var. *fuscans* on bean in U.S.A., 565.  
 — *polycolor* on tobacco, 16.  
 — *pruni* on cherry in U.S.A., 178, (?) 220.  
 — — on peach, control, 682; occurrence in Brazil, 87; in U.S.A., 178, 682.  
 — — on plum in Queensland, 641; in U.S.A., 178.  
 — — on *Prunus* in Brazil, 87.  
 — *pseudozoogloae* on tobacco in Italy, 659; in Sumatra, 473.  
 — *radicicola*, see *Bacillus radicicola*.  
 — *rathayi* on *Cynodon dactylon* and rye in Germany, 766.  
 — — on *Dactylis glomerata*, notes on, 514; occurrence in England, 492, 514; in Germany, 766.  
 — — on rye in Germany, 766.  
 [*Bacterium*] *rhizogenes* on apple, control, 452; factors affecting, 369; occurrence in U.S.A., 288, 289, 452; physiology of, 148, 288, 289; studies on, 288, 289.  
 — — on raspberry in U.S.A., 181.  
 — — on walnut in U.S.A., 288.  
 — *rubefaciens* on potato not accepted as the cause of spraining, 253.  
 — *rubrilineans*, see *Phytomonas rubrilineans*.  
 — *salicis* on *Salix*, legislation against, in U.S.A., 400.  
 — *setariae* can infect maize, oats, and wheat, 356.  
 — — on *Setaria italica* in Japan, 355.  
 — *sojae* on soy-bean in Brazil, 87; in Denmark, 78.  
 — *solanacearum* on banana (?) in British Guiana, 155; in Trinidad, 181.  
 — — on groundnut in Sumatra, 153.  
 — — on *Physalis peruviana* in Ceylon, 146.  
 — — on potato, control, 85, 563, 790; effect of, on yield, 85; note on, 790; occurrence in Brazil, 790; in U.S.A., 85, 563.  
 — — on teak in Java, 153.  
 — — on tobacco, control, 335, 658; factors affecting, 658; occurrence in French Indo-China, 126; in Italy, 659; (?) in Madagascar, 335; in Sumatra, 473, 658.  
 — — on tomato, bacteriophage of, 686; control, 337; factors affecting, 658; occurrence in Fiji, 337; in Sumatra, 658.  
 — — on zinnia in Italy, 681.  
 — *stizolobii* on *Stizolobium deeringianum* in Brazil, 87.  
 — *syringae*, *Bact. vignae* and *Bact. vignae* var. *leguminiphila* synonyms of, 16.  
 — *tabacum*, bacteriophage of, 154, 744.  
 — — can infect *Nicotiana affinis*, *N. glutinosa*, *N. langsdorffii*, *N. longiflora*, *N. paniculata*, *N. rustica*, *N. sylvestris*, *N. sanderae*, 61.  
 — — on *Physalis virginiana* in U.S.A., 223.  
 — — on tobacco, breeding against, 611; control, 200, 222, 659; factors affecting, 85, 403; occurrence in Brazil, 87; in French Indo-China, 126; in Germany, 61, 659; in Italy, 659; in Rhodesia, 200; in Tanganyika, 60; in U.S.A., 85, 223, 403, 724; study on, 61; varietal susceptibility to, 61.  
 — *translucens* on barley in U.S.S.R., 493.  
 — (?) — on wheat in U.S.S.R., 17.  
 — — var. *undulosum* on rye and wheat in New S. Wales, 571; (?) in U.S.S.R., 297.  
 — *trifoliorum* on clover, 16.  
 — —, synonym of *Pseudomonas cerasi*, 16.  
 — *tumefaciens*, bacteriophage of, 744.  
 — — can infect beet, 686; *Bryophyllum calycinum*, 154; *cineraria*, 499; hop, 111; oleander and olive, 686; *Opuntia keyensis*, 39; peach, 111; *Pelargonium zonale*, 499; *Primula obconica*, 499; *Ricinus communis*, 111, 647, 740; *Sempervivum tectorum*, 448; *Sequoia gigantea* and (?) *S. sempervirens*, 566; sunflower, 17, 112; tomato, 17, 111, 740.

[*Bacterium tumefaciens*], comparison of, with *Bacillus radiobacter* and *Bact. rhizogenes*, 288, 289.

—, effect of electricity, heat, and osmic acid on, 17; of various metals on, 647.

—, (?) filterable stage of, 154.

—, gall formation by, 565.

—, mixed inoculations with tomato streak and, 601.

—, on almond in Italy, 680; in U.S.A., 289; in Victoria, 111.

—, on apple, control, 499; occurrence in Germany, 740; in Hungary, 499; in U.S.S.R., 493; viability of, 740.

—, on beet in Europe, 548.

—, on *Bryophyllum calycinum*, movement of, in tissues, 565.

—, on *Carnegiea gigantea* in U.S.A., 39.

(?) —, on chrysanthemum in England, 635.

—, on *Chrysanthemum frutescens*, movement of, in tissues, 565.

—, on *Libocedrus decurrens* in U.S.A., 289.

—, on loquat and olive, legislation against, in Egypt, 544.

—, on peach in Italy, 680.

—, on pear, *Petunia hybrida*, and quince in Hungary, 499.

—, on raspberry, control, 219; occurrence in Belgium, 448; in U.S.A., 180, 219, 288, 289; physiology of, 288, 289; studies on, 288, 289.

—, on rose in England, 313.

—, on sunflower, factors affecting, 17.

—, on tobacco, mixed inoculations with tomato streak virus and, 384.

—, on tomato, factors affecting, 17; gall formation by, 565; note on, 740.

—, on vine, note on, 499; occurrence in Germany, 740; relation of, to 'broussin' tumours, 676.

—, on walnut in U.S.A., 289.

—, physiology of, 148, 288, 289, 686.

—, rough and smooth types of, 154.

—, serological study on, 430.

—, toxicity of various elements to, 647.

—, viability of, 740.

*vascularum* can infect maize, 354; can infect sorghum, 354.

—, on sugar-cane in Barbados, 531; in Queensland, 332.

*vesicatorium* on *Capsicum*, legislation against, in Cuba, 400.

—, on chilli in U.S.A., 344.

—, on tomato, legislation against, in Cuba, 400; (?) occurrence in Italy, 681.

*vignae* on *Phaseolus lunatus*, 16.

—, synonym of *Bact. syringae*, 16.

—, var. *leguminophila* on bean, comparison of, with allied species, 16; factors affecting, 565; occurrence in England and Wales, 492; in U.S.A., 565; synonym of *Bacterium syringae*, 16.

*viridiflavum* can infect *Delphinium*, 16.

—, on bean, comparison of, with allied species, 16; occurrence in U.S.A., 565.

*viridilividum* on lettuce, 16.

Baiouid disease of date palm, see *Fusarium albedinis* on.

*Balaninus caryae*, *Beauveria bassiana* and *Melarrhizium anisopliae* as parasites of, 429.

*Balanisia* on (?) *Andropogon aciculatus*, poisoning of cattle and goats by, in India, 630.

—, *cynodontis* on *Cynodon dactylon* in S. Africa, 794.

Bamboo (*Arundinaria*, *Bambusa*, *Phyllostachys*, *Semiarundinaria*, &c.), *Asterinella hiugensis* on, in Japan, 107.

—, *Colletotrichum hsienjenchang* on, in Japan, 498.

—, *Engleromyces goetzei* on, in the Belgian Congo, 333.

—, *Ganoderma applanatum* on, in Japan, 532.

—, *Phragmothyrium japonicum* on, in Japan, 108.

—, *semiarundinariae* on, in Japan, 107; *Micropeltis bambusicola* synonym of, 107.

Banana (*Musa* spp.), (?) bacterial wilt of, in Mauritius, 84.

—, *Bacterium solanacearum* on, (?) in British Guiana, 155; in Trinidad, 181.

—, bunchy top of, in Fiji, 45; relation of, to celery virus 1, 112.

—, celery virus 1 on, in U.S.A., 112, 615; transmission of, by *Aphis gossypii*, and *A. maydis*, 112.

—, *Ceratostomella paradoxa* on, in Australia, 517.

—, *Cercospora musae* on, losses caused by, 44; occurrence in Fiji, 44; in Queensland, 216; in Trinidad, 45; studies on, 44, 45; varietal resistance to, 45, 46.

—, *Clitocybe* on, in New S. Wales, 348.

—, diseases, book on, 323; control in storage, 450; legislation against, in Brazil, 544; in Eritrea, 816; occurrence in Queensland, 596.

—, *Fusarium oxysporum cubense* on, control, 13, 113, 378, 643; factors affecting, 378; legislation against, in Jamaica, 113, 815; notes on, 323, 397; occurrence in (?) British Guiana, 155; in Costa Rica and Honduras, 378; in Jamaica, 113, 378, 426, 643; in Malaya, 81; in Panama, 378; in Trinidad, 13, 181; in Venezuela, 397; possible early record of, 155; viability of, 378.

—, *Gloeosporium musarum* on, in Australia, 517; in Sierra Leone, 427.

—, *Helminthosporium torulosum* on, in the Philippines, 312, 323; in Sierra Leone, 427.

—, *Marasmius* on, in Fiji, 45.

—, *stenophyllus* on, in the Gold Coast, 14; in the Ivory Coast, 154.

—, moulds, control, 450.

—, *Nigrospora musae* on, in Australia, 517.

—, *Phytophthora* on, in Australia, 517.

—, *Rhinotrichum* on, in Sierra Leone, 428.

—, *Scolecoctrichum musae* on, in Fiji, 45.

—, speckle in Queensland, 216.

—, *Stachyldium theobromae* on, in Sierra Leone, 427.

—, *Uromyces musae* on, in Fiji, 45; in the Philippines, 608.

[Banana] virus diseases in Queensland, 596.  
 —, see also Plantain.

Barberry (*Berberis*), *Aecidium berberidis-thunbergii* on, in Japan, 796.  
 — eradication in Australia, 815; in Germany, 568; in Rumania, 49; in U.S.A., 219; in U.S.S.R., 18.  
 —, *Phytoponas berberidis* on, in Denmark, 78.  
 —, *Puccinia culmica* on, considered to be a form of *P. graminis*, 796.  
 —, — *graminis* on, early work on heteroecism in, 350; legislation against, in U.S.A., 63, 672; notes on, 88, 215; occurrence in Germany, 88, 350; in New S. Wales, 619; in Rumania, 215; in U.S.A., 155, 219; in U.S.S.R., 291; saltation in, 155; specific and varietal resistance to, 63, 672.

Barium, effect of, on resistance of *Ricinus* to *Bacterium tumefaciens*, 647.  
 — hydroxide, effect of, on tobacco mosaic, 402.  
 — polysulphide, use of, against *Plasmopara viticola* on vine, 10.  
 — salicylate, effect of, on wheat germination, 228.

Bark canker of *Hevea* rubber in Java, 743.  
 — 'splitting' disease of coffee in Dutch East Indies, 743.

Barley (*Hordeum*), *Alternaria* on, in U.S.A., 503.  
 —, bacteria on, causing kernel discoloration, in U.S.A., 503.  
 —, *Bacterium translucens* on, in U.S.S.R., 493.  
 —, *Cercosporaella herpotrichoides* on, 503; in U.S.A., 230.  
 —, (?) *Cortinarius* on, in England, 621.  
 — diseases, control in Kenya, 744.  
 —, *Erysiphe graminis* on, breeding against, 625; control, 433; factors affecting, 26, 92, 689; genetics of resistance to, 92; nature of resistance to, 25, 26, 711; notes on, 689; occurrence in Austria, 624; in Germany, 26, 92, 433, 624, 689; in Rumania, 624; in U.S.A., 25; physiologic forms of, 92, 624; studies on, 25, 92; varietal resistance to, 92.  
 —, *Fusarium* on, in France, 570; in U.S.A., 503.  
 —, — *culinorum* on, in Canada, 688.  
 —, — var. *cereale* on, in the Argentine, 720.  
 —, *Gibberella saubinetii* on, control, 503; feeding experiments with, 231, 434; note on, 149; occurrence in Japan, 296; in U.S.A., 149, 231, 503, 749; physiologic forms of, 297; variation in, 297, 749.  
 —, *Gibellina cerealis* can infect, 26  
 —, *Helminthosporium* on, in U.S.A., 503.  
 —, — *gramineum* on, control, 20, 21, 27, 28, 159, 380; cytological study on, 433; factors affecting, 28; method of infection by, 27; occurrence in Canada, 53; in Denmark, 27; in Germany, 20, 27, 159, 299, 353; in Sweden, 21; in U.S.A., 353; *Pyrenophora trichostoma* ascigerous stage of, 299; specialization and variation in, 353; study on, 27; varietal susceptibility to, 28, 353.

[Barley, *Helminthosporium sativum* on, control, 80, 299, 503, 688; notes on, 299; occurrence in Burma, 286; in Canada, 688; in Germany, (?) 159, 299; in India, 80; in U.S.A., 503; varietal susceptibility to, 80.  
 —, — *teres* on, see *Pyrenophora teres* on.  
 —, manganese injury to, 404.  
 —, *Marssonia* on, in France, 424.  
 —, *Nematosporangium* on, in Japan, 498.  
 —, *Ophiobolus graminis* on, control, 621; factors affecting, 157, 621; occurrence in England, 621; in France, 503, 570; in Germany, 157; study on, 157; virulence of, 157.  
 —, *Penicillium* on, in Canada, 158.  
 —, *Puccinia anomala* on, factors affecting, 624; occurrence in the Argentine, 27; in Germany, 624; in U.S.A., 624; in U.S.S.R., 292; physiologic forms of, 27, 624.  
 —, — *agropyri* can infect, 501.  
 —, — *glumarum* on, in the Argentine, 27; in France, 20.  
 —, — *graminis* on, in Canada, 225; in U.S.A., 687.  
 —, — *triticina* can infect, 225.  
 —, — on, in Japan, 299.  
 —, *Pyrenophora teres* on, control, 80, 159, 299; factors affecting, 159, 424; occurrence (?) in France, 424; in Germany, 159, 299; in India, 80; in Tunis, 429; varietal susceptibility to, 80.  
 —, *Pythium* on, in Japan, 498.  
 —, reclamation disease of, in Germany, 255.  
 —, *Rhynchosporium secalis* on, in the Argentine, 15; in Tunis, 429.  
 —, *Ustilago hordei* on, albino strain of, 353; control, 80, 158, 572, 620, 745; genetics of resistance to, 158; hybridization of, with *U. medians*, 352; method of testing resistance to, 623; occurrence in Canada, 158, 623, 745; in China, 745; in Egypt, 158; in Germany, 620; in India, 80; in Queensland, 572; in U.S.A., 352, 353; physiological forms of, 624; study on, 158; varietal susceptibility to, 158, 623.  
 —, — *medians* on, in U.S.A., 352, 353.  
 —, — *nuda* on, control, 27, 296, 745; factors affecting, 296; occurrence in China, 745; in Denmark, 27; in Germany, 296; in Rumania, 215; in U.S.A., 352; varietal resistance to, 215.  
 —, *Wojnowicia graminis* on, in U.S.A., 569.  
 'Barn spot' of tobacco, new type, caused by *Aspergillus flavus* in Rhodesia, 678.  
 (?) Basal glume rot of wheat in Kenya, 427.  
 — roll of potato in Germany, 387.  
 Basidiomycetes, sexual repulsion in the, 645.  
 Bauhinia, *Fomes noxius* on, in Japan, 532.  
 'Baumspritzmittel', use of, against *Venturia inaequalis* on apple, 371.

Bayer dip dust, use of, against *Actinomyces scabies* on potato, 118.

*Edellospora helicoides* on *Amoeba terricola* in U.S.A., 360.

Beans, *Ascochyta boltshauseri* on, in U.S.A., 613; synonymy of, 614.

—, *Bacillus prodigiosus* on, serological reaction to, 713.

—, *proteus* group on, serological reaction to, 78, 713.

—, bacteria on stored, in U.S.A., 322.

—, *Bacterium flaccumfaciens* on, in U.S.A., 565.

—, *medicaginis* on, in New Zealand, 140.

—, — var. *phaseolicola* on, comparative studies on, 16; control, 72; detection of seed infection by, 733; factors affecting, 565; occurrence in Australia, 289; in France, 286; in Germany, 72, 415; in New S. Wales, 733; in U.S.A., 565; variation in, 289; varietal resistance to, 72, 286, 415.

—, — *phaseoli* on, control, 341, 415; factors affecting, 415, 565; occurrence in Bermuda, 560; in Bulgaria, 341; in Canada, 415; in U.S.A., 565; varietal susceptibility to, 341, 415.

—, — var. *fusca* on, in U.S.A., 565.

—, — *vignae* var. *leguminophila* on, comparison of, with allied species, 16; factors affecting, 565; occurrence in England and Wales, 492; in U.S.A., 565.

—, — *viridiflavum* on, comparison of, with allied species, 16; occurrence in U.S.A., 565.

—, *Botrytis* on, in England, 734.

—, — *cineraria* on, immunization against, 188, 602, 712, 783.

—, — (?) *fabae* on, in Cyprus, 734.

—, *celery* virus 1 can infect broad, 5; occurrence in U.S.A., 615.

—, *Cercospora canescens* on, in Brazil, 87.

—, — *cruenta* on, 280.

—, — *fabae* on, in Italy, 681.

—, — *zonata* on broad, in Cyprus, 83; in Italy, 681.

—, chocolate spot of, see *Botrytis* on.

—, *Cladosporium pisicolum* can infect broad, 71.

—, *Colletotrichum lindemuthianum* on, in Brazil, 734; in Germany, 670.

—, — *phaseolorum* can infect, in Japan, 342.

—, — *truncatum* on, in U.S.A., 416; synonymy of, 416.

—, *Corticium solani* can infect, 603.

—, — on; occurrence in Brazil, 734; in U.S.A., 671.

—, curly top of, in U.S.A., 339.

—, diseases in England, 414.

—, *Erysiphe polygoni* on, in U.S.A., 207.

—, *Fusarium* on, in England, 730; in U.S.A., 207.

—, — *solani* var. *martii* on, in England, 730; in U.S.A., 334.

—, *Isoariopsis griseola* on, in Brazil, 87, 734; in Spain, 396.

[Beans], *Macrophomina phaseoli* on, in Cyprus, 83; in U.S.A., 670.

—, mosaic of, breeding against, 148, 810; effect of, on transpiration, 385; occurrence in Brazil, 734; in France, 77, 286; in Japan, 4; in Tunis, 429; in U.S.A., 72, 148, 810; transmission of, by *Aphis rumicis*, *Macrosiphum pisi*, and *Myzus persicae*, 4; by needle, 4; by seed, (?) 77, 734; to peas and sweet peas, 4; varietal resistance to, 286, 734. (See also viruses 1 and 2 on.)

—, moulds on stored, in U.S.A., 322.

—, *Oidium* on, in Brazil, 734.

—, pea mosaic can infect, 486.

—, (?) *Pullularia pullulans* on, in U.S.A., 2.

—, Pythiaceous fungus on, in Denmark, 559.

—, *Pythium aphanidermatum* on, in Japan, 498.

—, (?) *Rhizoctonia microsclerotia* on, in U.S.A., 416.

—, spotting of, in U.S.A., 810.

—, tobacco mosaic can infect, 199, 474, 659, 721, 722. (See also tobacco virus 1.)

—, — virus 1 can infect, 474, 722.

—, tomato spotted wilt can infect broad, 201, 212; occurrence in England, 107.

—, *Uromyces appendiculatus* on, control, 670; factors affecting, 747; occurrence in Brazil, 734; in U.S.A., 416, 669; studies on, 416, 669, 734.

—, — *fabae* f.sp. *viciae sepium* can infect broad, 141.

—, virus 1 and 2 in U.S.A., 72.

—, yeasts on stored, in U.S.A., 322.

—, yellow mosaic of, see virus 2 on.

*Beauveria bassiana* can infect tomato, 405; *Balaninus caryae*, 429; *Pyrausta nubilalis*, 444.

—, — on *Galleria mellonella* in France, 629.

—, — on *Stephanoderes hampei* in the Belgian Congo, 224.

—, — on *Tenebrio molitor*, antagonism between *Bacillus prodigiosus* and, 361.

—, *doryphorae* on *Leptinotarsa decemlineata* in France, 507.

Beech (*Fagus*), *Dothidea noxia* on, in Holland, 12.

—, *Mycelium radicum nigrostrigosum* on, forming mycorrhiza in Sweden, 187.

—, *Nectria* on, in U.S.A., 663.

—, *Phytophthora cambivora* and *P. syringae* on, in England, 264.

Bees as vectors of *Bacillus amylovorus* on apple, 318, 370; of *Bacterium nectrophilum* on pear, 453.

Beet (*Beta vulgaris*), *Actinomyces* can infect, 340; occurrence on, in Czechoslovakia, 73; in Europe, 548.

—, — (?) *scabies* on, in Sweden, 340.

—, 'albinism' of, in Germany, 808.

—, *Alternaria* on, in Holland, 12.

—, — (?) *tenuis* can infect, 281.

—, *Aphanomyces levis* on, in Europe, 548; in Holland, 209.

[Beet], *Bacterium beticola* on, physiological study on, 686.

—, — *forniosanum* can infect, 738.

—, — *tumefaciens* can infect, 686; occurrence in Europe, 548.

—, 'black wood vessel disease' of, see *Pythium* on.

—, celery virus I can infect, 5; occurrence in U.S.A., 615.

—, *Cercospora beticola* on, control, 488, 813; note on, 149; occurrence in Austria, 813; in Europe, 548; in U.S.A., 149, 220, 488; overwintering of, 220.

—, *Cladosporium herbarum* can infect, 281.

—, *Corticium solani* on, control, 671, 809; occurrence in the Argentine, 15; in Irish Free State, 809; in North America, 207; in U.S.A., 671; study on, 207.

—, crinkle of, in Germany and Poland, 548; transmission of, by *Zosmienus quadratus*, 548.

—, crown rot of, see dry and heart rot of.

—, curly top, effect of, on yield, 488; histological studies on, 487, 813; host range of, 171, 339; isolation of virus of, 550; legislation (proposed) against, in U.S.A., 488; nature of resistance to, 551; occurrence in U.S.A., 171, 339, 487, 488, 809, 813; overwintering of, 171; properties of virus of, 550; studies on, 171, 487, 813; transmission of, by *Eutetix tenella*, 171, 339, 550; varietal resistance to, 488, 809.

—, diseases in Europe, 548; in Germany, 424, 461; in Holland, 608.

—, dry and heart rot of, boron deficiency in relation to, 141, 256, 548, 551, 552; control, 73, 282, 552, 613, 732, 733, 808; factors affecting, 282, 552, 808; losses caused by, 282; occurrence in Belgium, 808; in Europe, 548; in France, 282; in Germany, 73, 141, 613, 733, 808; in Holland, 732, 733; in Irish Free State, 551; in U.S.S.R., 552; varietal susceptibility to, 552.

—, (?) *Fusarium* on, in Europe, 548.

—, — *conglutinans* var. *betae* on, in Belgium and Holland, 549.

—, *Helicobasidium purpureum* can infect, 730; occurrence in Europe, 548.

—, 'jaunisse' and 'jaunissement' of, distinction between, 549.

—, leaf scorch of, in Europe, 548.

—, *Ligniera* on, in Holland, 12.

—, *Macrophomina phaseoli* on, in U.S.A., 670.

—, manganese deficiency disease of, in Europe, 548; in Holland, 549.

—, — injury to, in Germany, 404.

—, *Microsphaera betae* on, in Europe, 548.

—, mosaic in Belgium, 72, 342, 549; in Canada, 494; in England, 548; in Europe, 548; in France, 327; in Germany, 417, 808; in Holland, 549; physiology of, 808; properties of virus of, 342; serological studies on, 185, 327; study on, 342; transmission of, by *Myzus persicae*, 473; to tobacco, 473.

[Beet], *Mucor hiemalis* on, in Europe, 655.

—, *Mycosphaerella tabifica* on, in Spain, 396; perfect stage of *Phoma betae* (q.v.), 396, 552.

—, *Peronospora schachtii* on, in Europe, 548.

—, *Phoma betae* on, action of *Torula convoluta* on, 281; control, 21, 151, 282, 548, 552, 809; effect of, on yield, 282; factors affecting, 73, 282; note on, 551; occurrence in Czecho-Slovakia, 73; in Europe, 548; in France, 282, 552; in Irish Free State, 809; in Sweden, 21; in U.S.A., 151; in U.S.S.R., 281; study on, 281. (See also *Mycosphaerella tabifica* on.)

—, *Phytophthora drechsleri* on, in U.S.A., 147.

—, Pythiaceous fungus on, in Denmark, 559.

—, *Pythium* on, control, 563, 588; effect of, on yield, 209; occurrence in Europe, 548; in Holland, 209; in U.S.A., (?) 563, 588.

—, — *de Baryanum* on, control, 209, 548, 809; factors affecting, 73; occurrence in Czecho-Slovakia, 73; in Europe, 548; in Holland, 209; in Irish Free State, 809.

—, — *ultimum* on, in Canada, 605; in U.S.A., 383, 671.

—, *Ramularia beticola* on, in Europe, 548.

—, reclamation disease of, in Holland, 209.

—, *Rhizoctonia* on, in U.S.A., 563.

—, *Sclerotium* (?) *rolfsii* on, in U.S.A., 488.

—, *Trichoderma koningi* and *T. lignorum* on, in U.S.S.R., 551.

—, *Typhula betae* on, in Europe, 548.

—, *Uromyces betae* on, in Europe, 548.

—, *Urophlyctis leproides* on, in Europe, 548; in Tunis, 429.

—, *Verticillium* on, in Belgium, 549; (?) in Europe, 548; in Holland, 549.

—, virus disease of, in Czecho-Slovakia, 548.

—, yellows, effect of, on yield, 549; etiology of, 417, 548, 549; occurrence in Belgium, 72, 342, 549; in England, 548; in Europe, 548; in France, 327; in Germany, 417, 549; in Holland, 12, 209, 417, 549; in Spain, 417; study on, 209; transmission of, by *Aphis fabae*, 548; by juice, 342; types of, 209, 548, 549.

*Begonia*, *Bacterium begoniae* on, in Japan, 498.

—, *Macrophomina phaseoli* on, in U.S.A., 670.

—, *Oidium begoniae* on, in Germany, 447.

—, tomato spotted wilt can infect, 404.

*Benincasa cerifera*, *Pythium aphanidermatum* can infect, 7.

Bentonite, use of, with copper compounds against plant diseases, 381, 382, 591.

— sulphur, use of, against *Venturia inaequalis* on apple, 151.

Benzoic acid, use of, against *Peronospora* on tobacco, 403.

*Berberis*, see Barberry.

'Bennburg preventive', composition and use of, against dry and heart rot of beet, 73.

*Bersama*, (?) *Stilbum* on, in Tanganyika, 678.

Berthoud and Berthoud Flux dusting apparatus, 716.

*Beta trigyna*, 'yellowing' of, in Belgium, 342.

— *vulgaris*, see Beet, Mangold.

Betel nut, see Areca palm.

Betel vine, see *Piper betle*.

Bethell process of timber preservation, 205.

Betoxin, use of, against *Calonectria graminicola* on rye, 21.

*Betula*, see Birch.

Big bud of tomato identical with tomato woodiness, 131.

— vein of lettuce in U.S.A., 283; relation of, to wheat mosaic, 283.

Bigirol, use of, against *Bacterium tumefaciens* on fruit trees, 499.

Birch (*Betula*), black knot of, in U.S.S.R., 269.

—, *Mycelium radicum nigrostrigatum* on, forming mycorrhiza, in Sweden, 187.

—, *Nectria* (?) *ditissima* on, in U.S.A., 338.

—, *galligena* on, in U.S.A., (?) 338, 794.

—, *Poria subacida* on, in U.S.A., 805.

—, *Sclerotinia betulae* on, in U.S.A., 663.

Bitter pit of apples, bibliography of, 369; control, 369; (?) due to a virus, 242, 316, 639; (?) early record of, in England, 462; occurrence in Bulgaria, 639; in Denmark, 558; in U.S.A., 592; synonymy of, 242.

— of pear and quince, virus nature of, 639, 640.

Black bean of coffee in India, 164.

Blackberry (*Rubus* spp.), *Botrytis* on, in U.S.A., 288.

—, *Cercospora rubi* on, in U.S.A., 774.

— diseases in U.S.A., 642.

—, *Gymnoconia interstitialis* on, in U.S.A., 642.

—, moulds on stored, in U.S.A., 322.

—, *Mycosphaerella dubia* on, in U.S.A., 775; perfect stage of *Cercospora rubi*, 775.

—, raspberry mosaic on, in U.S.A., 218.

— virus diseases in U.S.A., 642.

Black currant, see Currants.

Black heart of celery in Canada and U.S.A., 343.

— of pineapple in Queensland, 216.

— knot of timber in U.S.S.R., 269.

— 'lesion' root rot of strawberry in England, 179.

— 'patch' of clover in U.S.A., 85.

— root of strawberry in U.S.A., 180, 348.

— rot of horse-radish in Germany, 419.

*Blastodendrion*, use of, in control of wood-pulp fungi, 275.

— *schweitzeri* on man in French Equatorial Africa, 631.

*Blastomyces dermatitidis*, see *Endomyces dermatitidis*.

[*Blastomyces*] *gilchristi*, synonym of *Gilchristia dermatitidis*, 100.

— *neiformans*, synonym of *Torulopsis neiformans*, 694.

'Blastomycetes', use of the term deprecated, 630.

*Blastomyces dermatitidis* and *B. immitis* degenerate strains of *Coccidioides immitis*, 445.

'Blastomycoses', use of the term deprecated, 630.

*Blastotrichum aranearium* on spiders in Ceylon, 443.

Bleaching powder, see Chloride of lime.

*Blechnum spicant*, *Corticium anceps* can infect, 797.

Blood albumin as a spreader, 506.

Blossom drop of pear in Natal, 453.

— end rot of tomato in Australia, 520; in U.S.A., 800.

Blotchy core of apple in Australia, 520.

Blue stain of timber in Finland, 729; in U.S.A., 612.

Bluette dusting apparatus, 716.

Blufina dusting apparatus, 716.

*Boehmeria frutescens* var. *concoloris*, *Cercospora fukuii* on, in Japan, 471.

— *japonica* var. *platanifolia*, *B. nivea*, *B. platiphylla*, and *B. tricuspidis*, *Ascochyta boehmeriae* on, in Japan, 512.

Bor-Am-Sup-Ka, use of, against dry and heart rot of beet, 613, 808.

*Borassus flabellifer*, see Palmyra palm.

Borax, presence of, in nitrate of soda, 733.

—, use of, against brown heart of swedes, 669; of turnip, 547; against dry and heart rot of beet, 551, 733, 808; against *Phoma destructiva* on tomato, 475; against tomato fruit rots, 263.

Bordeaux mixture, adhesiveness of, 779.

—, copper content of grapes treated with, 76.

—, cost of, 589.

—, deposits, weathering of, 381.

—, effect of high-magnesium lime on, 495, 607; of resin on, 597; of, on transpiration, 459, 708.

—, fungicidal action of, 381, 422.

—, injury, 200, 563, 594.

—, shading effect of, 79.

—, dry, use of, against *Bacterium angulatum*, *Bact. tabacum*, and *Cercospora nicotianae* on tobacco, 200.

—, 'instant', properties of, 349.

—, nicotine injury, 769.

—, oil, use of, against *Diaporthe citri* on *Citrus*, 161; against *Cocomyces hemicallis* on cherry, 150; against *Phomopsis* on *Juniperus virginiana*, 150; against *Sporotrichum citri* on citrus, 161, 578.

—, paste as a wound dressing, 567.

—, sulphite lye-nicotine, use of, against *Anuraphis rosae* and *Venturia inaequalis* on apple, 769.

Bordol-mulsion, use of, against *Sporotrichum citri* on citrus, 692.

Boric acid, a component of eusol, 754.

—, use of, against dry and heart rot of

beet, 282, 732; against 'corky pit' of apple, 592.

*Bornetina corium* on vine in Palestine, 357.

Boron deficiency in relation to brown heart of swedes, 558; to dry and heart rot of beet, 141, 256, 548, 551, 552, 613; to 'internal cork' of apple, 770; to maize diseases, 233; to plant diseases, 469; to strawberry diseases, 376.

— in tobacco, in U.S.A., 609.

— in tomato, 475.

—, see also Borax, Boric acid.

*Bosstrichoplites zickeli*, mycetomata of, in Egypt, 305.

*Botryodiplodia lecanidion*, *Ephelidium aurantium* a parasite of, and distinct from, 793.

—, *Paradiplodia aurantium* and *Pseudohaplosporella aurantium* synonyms of, 793.

—, *theobromae* on cacao, control, 566; occurrence in the British Empire, 87.

— on coffee in the Cameroons, 31.

— on grapefruit in Trinidad, 754.

(?) *Botryosphaeria* on lemon in Cyprus, 83.

— *ribis*, host range of, 196.

— on grapefruit in Trinidad, 754.

— var. *chromogena* on avocado in U.S.A., 196, 707.

— — — on *Cocos plumosa* and lemon in U.S.A., 196.

(?) — — — on mango in England, 518.

— — — on walnut in U.S.A., 196.

*Botrytis* in soil in U.S.A., 520.

— on bean in England, 734.

— on blackberry in U.S.A., 288.

— on lettuce in England, 730.

— on loquat in Japan, 498.

— on onion in Germany, 553.

— on *Solanum capsicastrum* in Germany, 366.

—, production of new types of, by interspecific anastomosis, 195, 710.

— *allii*, anastomosis of, with *B. ricini*, 195, 710.

— — — on onion in Poland, 49; toxicity of phenolic compounds to, 553.

— *cinerea*, action of, on *Corticium solani*, 188.

— — —, cultural study on, 60.

— — — in air over the Atlantic, 384.

— — — in soil, effect of lignin on development of, 392.

— — — on apple in U.S.A., 287; virulence of, 40.

— — — on avocado in Sierra Leone, 428.

— — — on bean, immunization against, 188, 602, 712, 783.

— — — on Cactaceae in Germany, 699.

— — — on fig in England, 617.

— — — on *Jatropha podagrica* in Sierra Leone, 428.

— — — on man in Hungary, 695.

— — — on plum in England, 641.

— — — on rose in England, 313, 363.

— — — on vine, control, 11, 145, 213, 491; occurrence in Austria, 11; in France, 145; in S. Africa, 213, 491; study on, 213.

[*Botrytis*] *elliptica* on lily in England, 513.

— (?) *fabae* on bean in Cyprus, 734.

— *narcissicola* on narcissus in England, 366.

— *paeoniae* on peony in the Argentine, 15.

— — —, toxicity of various elements to, 244.

— *polyblastic* on *Narcissus* in England, 366; in Jersey, 637.

— *ricini*, anastomosis of, with *B. allii*, 195, 710.

— *tulipae* on tulip in England, 366, 586.

'Bouillies céleste', use of, against *Plasmodiopsis viticola* on vine, 76. (See also Cuprammonium sprays.)

Bouisol, use of, against *Botrytis cinerea* on vine, 213; against *B. tulipae* on tulip, 586; against *Cerotellum fici* on fig, 560; against *Colletotrichum* on *Piper betle*, 718; against *Phytophthora infestans* on potato, 84; against *P. parasitica nicotianae* on tobacco, 533; against tobacco diseases, 200.

*Box* (*Buxus sempervirens*), *Ceratostomella buxi*, *Fomes ferruginosus*, and *Rosellinia aquila* on, in U.S.S.R., 62.

*Brachartona catoxantha*, bacterial and fungal diseases of, in Java, 152.

*Brachysporium* as a constituent of sooty moulds in New S. Wales, 60.

— on rice in Indo-China, 486.

— *batatasis* on sweet potato in U.S.S.R., 652.

— *capsici*, *B. ovoideum*, and *B. sene-galense* on chilli in Japan, 344.

— *tomato* on chilli and tomato in Japan, 344; *Helminthosporium tomato* renamed, 344.

Bramble, see Blackberry, *Rubus*.

*Brassica*, *Cystopus candidus* var. *macrospora* on, in Japan, 1.

—, virus disease in, in England, 669; transmission of, by *Myzus persicae* and by sap, 669; to cabbage, *Nicotiana glutinosa*, *N. langsdorffii*, and tobacco, 669.

— *alba*, see Mustard.

— *campestris*, see Swedes, Turnip.

— *cernua*, *Cystopus candidus* on, in Japan, 2.

— *chinensis*, *Alternaria brassicae* (Berk.) Bolle on, in the Philippines, 140.

— — —, *Bacterium formosanum* can infect, 738.

— — —, *Cystopus candidus* on, in Japan, 2.

— — —, *Peronospora parasitica* on, in Japan, 1.

— — —, *Pythium aphanidermatum* can infect, 7.

— *junccea*, *Peronospora parasitica* can infect, 1.

— *napus*, see Rape.

— *nigra*, see Mustard.

— *oleracea*, see Broccoli, Brussels sprouts, Cabbage, Cauliflower.

— — — var. *acephala*, see Marrow-stem Kale.

— — — var. *caulo-rapa*, see Kohlrabi.

— — — var. *pekinensis*, see Cabbage, Chinese.

— *rapa*, see Turnip.

Bread, *Aspergillus niger* on, 691.

—, fungus flora of leavens of, in Italy, 383.

Breakdown of plum in S. Africa, 321.  
 'Breaking' of *Matthiola incana* in U.S.A., 172.  
 — of tulips in England, 366.  
*Bremia lactucae* on lettuce in U.S.A., 683.  
*Brevicoryne brassicae* transmitting turnip mosaic, 731.  
*Broccoli* (*Brassica oleracea*), *Alternaria brassicae* (Berk.) Bolle on, in Canada, 494; in the Philippines, 140.  
 —, — *oleracea* on, in Canada, 494.  
*Bromus*, *Puccinia rubigo-vera* on, specialization in, 746.  
 — 'pupation' virus disease of, in U.S.S.R., 493.  
 — *altissimus* and *B. ciliatus*, *Puccinia tomipara* on, in U.S.A., 747.  
 — *inermis*, *Gibberella saubinetii*, *Helminthosporium sativum*, and *Ophiobolus graminis* on, in Canada, 623.  
 — *japonicus*, *Ustilago bromivora* on, in U.S.S.R., 493.  
 — *mollis*, *Corticium fuciforme* on, in Great Britain, 587.  
 — *purgans*, *Puccinia tomipara* can infect, 747.  
 — *schraderi*, *Ophiobolus graminis* can infect, 503.  
 — *tectorum*, *Cercosporaella herpotrichoides* on, in U.S.A., 569.  
 —, — *Wojnowicia graminis* on, in U.S.A., 569.  
 — *unioloides*, *Ustilago bromivora* on, in Queensland, 572.  
 'Bronze leaf wilt' of coco-nut in Trinidad, 579.  
 Bronzing of *Aleurites fordii* on, in U.S.A., 481.  
 — of citrus in U.S.A., 442.  
 'Broussins' of vine in France, 676.  
*Browallia*, tomato spotted wilt can infect, 404.  
 Brown heart of apple in Australia, 770; in U.S.A., 592.  
 — of swedes, control, 558, 669; 'mottled heart' identical with, 558; occurrence in Great Britain, 558, 669; in Ireland, 669.  
 — of turnip, control, 547; losses caused by, 70; occurrence in Canada, 70, 547; in Europe and U.S.A., 70.  
 — markings on grapefruit and orange from S. Africa, 754.  
 — neck of wheat in Tunis, 429.  
 — 'oak' disease of oak, caused by *Fistulina hepatica*, 663; occurrence in England, 136, 413; in U.S.A., 663.  
 — patch of turf in Holland, 240.  
 — spot of orange, suggested virus nature of, 505.  
 'Brunissure' of vine in France, 214.  
 Brussels sprouts (*Brassica oleracea*), virus disease of, in England, 669; transmission of, by *Myzus persicae* and by sap, 669; to *Nicotiana glutinosa*, *N. langsdorffii*, and tobacco, 669.  
*Bryophyllum calycinum*, *Bacterium tumefaciens* can infect, 154.  
 —, —, — on, secondary tumour formation by, 565.  
 [*Bryophyllum calycinum*], *Omphalia flavidia* can infect, 184.  
 Buckskin disease of cherry in U.S.A., 111.  
*Buckwheat* (*Fagopyrum esculentum*), *Corticium solani* can infect, 603.  
 —, magnesium deficiency disease of, in U.S.A., 645.  
*Bullera* a genus of the Sporobolomycetes, 655.  
 Bunch-end rot of oil palm in Malaya, 357.  
 Bunchy top of banana, note on, 112; occurrence in Fiji, 45.  
 — — of *Musa textilis* in the Philippines, 37.  
 — — of tomato in S. Africa, 799; transmission of, to chilli, eggplant, *Nicandra physalodes*, petunia, *Physalis angulata*, *P. peruviana*, *P. viscosa*, potato, *Solanum aculeastrum*, *S. aculeatissimum*, *S. duplosinuatum*, *S. incanum*, *S. nigrum*, *S. panduraeforme*, *S. sodomaeum*, and tobacco, 800.  
 Burgundy mixture, fungicidal action of, 422.  
 — —, toxicity of, to *Botrytis allii*, 49.  
 — — tartrate mixture, use of, against *Plasmopara viticola* on vine, 76.  
*Burmannia candida*, mycorrhiza of, *Phycomycetoid* fungus forming, in Java, 248.  
 Burnett process of timber preservation, 543.  
 'Burning-back' of *Eriobotrya japonica*, plane, and vine in Australia, 520.  
 Butter, *Acremoniella brevis* in, in U.S.A., 237.  
 —, *Acrostalagmus* in, 761.  
 —, — *cinnabarinus* in, in U.S.A., 237.  
 —, *Alternaria* in, 761; in U.S.A., 237.  
 —, — *Aspergillus* in, in U.S.A., 237.  
 —, — *glaucus* in, 761.  
 —, — *niger* in, in U.S.A., 237.  
 —, — *Cladosporium* in, in Canada, 633.  
 —, — *herbarum* in, 761.  
 —, — *Fusarium* in, 761.  
 —, — *culmorum* in, in Australia and New Zealand, 761.  
 —, — *Gliocladium* in, 761.  
 —, — *Hormodendrum* in, in U.S.A., 237.  
 —, — *Monilia geophila* in, in U.S.A., 237.  
 —, — moulding of control, 633, 762; factors affecting, 237, 633, 761; occurrence in Canada, 633; in U.S.A., 236.  
 —, — *Mucor* in, 761.  
 —, — *plumbeus* in, in U.S.A., 237.  
 —, — *Oospora lactis* in, 761; in U.S.A., 237.  
 —, — *Penicillium* in, 761.  
 —, — *fellutatum*, *P. griseo-fulvum*, and *P. viridicatum* in, in U.S.A., 237.  
 —, — *Phoma* in 761; in U.S.A., 237.  
 —, — *alternariaceum* in, 761.  
 —, — *Rhizopus speciosus* in, in U.S.A., 237.  
 —, — *Stemphylium* in, 761; in U.S.A., 237.  
 —, — *Stysanus*, *Trichoderma lignorum*, *Trichothecium roseum*, and *Verticillium* in, 761.  
 —, yeast content of, as a measure of creamery sanitation, 633.

*Buxus*, see Box.

*Byssochlamys fulva* on blackcurrant, gooseberry, loganberry, plum, and strawberry and on processed fruit in England, 775.

Cabbage (*Brassica oleracea*), *Alternaria brassicæ* (Berk.) Bolle on, in the Philippines, 140.

—, — *oleracea* on, in Burma, 286; in U.S.A., 340.

—, *Bacterium formosanum* can infect, 738.

—, cauliflower virus can infect, 207.

—, (?) *Corticium solani* on, in U.S.A., 151.

—, diseases, control, 277.

—, *Fusarium conglutinans* on, method of infection by, 732; note on, 206; occurrence in Cuba, 206; in U.S.A., 485, 732; varietal resistance to, 485, 732.

—, manganese excess disease of, in Germany, 404.

—, *Moniliopsis aderholdi* on, in U.S.S.R., 278.

—, mosaic in U.S.A., 414.

—, *Mucor racemosus* on, in Europe, 655.

—, *Mycosphaerella brassicicola* on, in India, 470.

—, *Peronospora parasitica* on, factors affecting, 277, 546, 565; hetero- and homothallism in, 415; occurrence in Holland, 546; in U.S.A., 415, 546, 565; in U.S.S.R., 277.

—, *Phoma lingam* on, in Canada, 494; in New Zealand, 547.

—, *Plasmodiophora brassicae* on, control, 277, 278, 545, 732, 807; method of infection by, 206; occurrence in Germany, 545; in New Zealand, 278, 732; in U.S.A., 148, 206, 807; in U.S.S.R., 277; studies on, 206, 277; varietal susceptibility to, 148, 277.

—, *Pseudomonas campestris* on, in Bulgaria, 1; in Sumatra, 153.

—, Pythiaceous fungus on, in Denmark, 559.

—, (?) *Pythium* on, in U.S.A., 151, 563.

—, — *aphanidermatum* can infect, 7.

—, *Rhizoctonia* on, in U.S.A., 563.

—, turnip mosaic can infect, 731.

—, virus disease of, in England, 669; transmission of, by *Myzus persicae*, 669; to *Nicotiana glutinosa*, *N. langsdorffii*, and tobacco, 669.

Cabbage, Chinese (*Brassica pekinensis*), *Alternaria brassicæ* (Berk.) Bolle on, in the Philippines, 140.

—, —, — *oleracea* on, in U.S.A., 340.

—, —, — *Bacterium formosanum* can infect, 738.

—, —, — *Cystopus candidus* on, in Japan, 2.

—, —, — *Peronospora parasitica* on, in Japan, 1.

Cacao (*Theobroma cacao*), *Armillaria mellea* on, in the British Empire, 87.

—, *Botryodiplodia theobromae* on, control, 566; occurrence in the British Empire, 87.

—, *Cephaleuros minimus* on, in the British Empire, 87.

[*Cacao, Cephaleuros*] *mycoidea* on, control, 566.

—, — *parasiticus* on, in the British Empire, 87.

—, *Colletotrichum luxificum* on, 566.

—, *Corticium koleroga* on, in the British Empire, 87.

—, — *salmonicolor* on, control, 566; occurrence in the British Empire, 87.

—, *Diplodia* on, in the Philippines, 567.

—, diseases, legislation against, in Brazil, 544; manual on, 224; shaping of trees in relation to, 566.

—, *Fomes lignosus* and *F. noxius* on, in the British Empire, 87.

—, *Fusarium* and *Gloeosporium* on, in the Philippines, 567.

—, *Irenopsis guianensis* on, in Venezuela, 397.

—, *Marasmius byssicola* on, in the British Empire, 87.

—, — *perniciosus* on, control, 13; factors affecting, 13; history of, 430; note on, 566; occurrence in Brazil, 430; in the British Empire, 87; in British Guiana and Ecuador, 430; in Surinam, 155, 430; in Trinidad, 13, 430; varietal resistance to, 155.

—, — *scandens* on, in the British Empire, 87; in the Ivory Coast, 153.

—, 'morte subita' of, in W. Africa, 566.

—, moulds, legislation against, in U.S.A., 14; occurrence in the British Empire, 87; in the Gold Coast, 14.

—, mycorrhiza in Trinidad, 601.

—, *Nectria cacaoicola* on, in the Ivory Coast, 397; perithecial stage of *Fusarium decemcellulare*, 397.

—, *Phytophthora palmivora* on, control, 217, 566, 567; occurrence in the British Empire, 87; in Nigeria, 217; in the Philippines, 567; (?) in Venezuela, 397.

—, *Rosellinia* on, in the British Empire, 87.

—, — *bunodes* and *R. pepo* on, in St. Lucia, 84.

—, *Sphaerostilbe repens*, *Trachysphaera fructigena*, and *Ustulina zonata* on, in the British Empire, 87.

—, wilt, non-parasitic, in Ceylon, 17.

Cactaceae, *Botrytis cinerea* on, in Germany, 699.

—, see also *Cactus, Carnegiea, Cereus, &c.*

*Cactus maxonii*, *Fusarium cacti maxonii* on, in Italy, 765.

Cadmium, effect of, on *Bacterium tumefaciens* and *Ricinus*, 647.

—, chloride, use of, against *Bacterium rhizogenes* on apple, 452.

—, compounds, use of, as fungicides, 244.

—, salicylate, effect of, on wheat germination, 228.

—, toxicity of, to *Tilletia caries*, 90.

*Cadophora americana* on wood pulp in U.S.A., 274.

—, *brunnescens* on timber in U.S.A., 729.

—, *fastigiata* in air and water in Scandinavia, 140, 275.

—, on wood pulp, antagonism of mycorrhizal to, 69; control 140; occurrence

in Scandinavia, 140, 545; in Sweden, 69, 275.

[*Cadophora*] *lagerbergii* on timber in Sweden, 275.

— *melinii* on wood pulp in Sweden, 275.

— *obscura* in water in Sweden, 275.

— — on wood pulp in Sweden, 275.

— *repens* on timber in U.S.A., 729.

— *richardsiae* on wood pulp in Sweden, 275; in U.S.A., 275.

*Caesalpinia gillesii*, *Phymatotrichum omnivorum* on, in U.S.A., 562.

Caffaro powder, use of, against *Dilophia graminis* on wheat, 750; against *Sclerotinia laxa* on cherry, 706; against *Urocystis tritici* on wheat, 620.

*Cajanus indicus*, see Pigeon pea.

*Calamagrostis epigea*, *Puccinia lolii* and *P. phragmitis* on, factors affecting sporulation in, 53.

*Calamintha acinos* and *C. clinopodium*, *Puccinia menthae* on, in Estonia, 530.

*Calcolearia*, tomato spotted wilt on, in U.S.A., 201.

Calcium arsenate, cost of, 649.

— —, use of, against *Alternaria solani* on potato, 649; against *Bacterium malacearum* on cotton, 33; with fungicides, 382, 495.

— caseinate as an adhesive, 489.

— — as a spreader, 46, 150, 649.

— cyanamide, use of, against (?) *Corticium solani* on cucumber, 151; against damping-off of ornamental plants, 684; against *Erysiphe graminis* on barley, 433; against *Plasmopodiphora brassicae* on cabbage, 807; on rape, 151; against (?) *Pythium* on cucumber, 151; against *Puccinia triticina* on wheat, 500.

— deficiency in relation to potato medullary necrosis, 253.

— polysulphide, use of, against *Plasmodiopara viticola* on vine, 10.

— salicylate, effect of, on wheat germination, 228.

— —, toxicity of, to *Tilletia caries*, 90.

— salts, significance of, in timber decay, 543.

— sulphate, use of, in a copper dust, 145. (See also Fertilizers.)

— sulphide, use of, against *Peronospora* on tobacco, 403.

*Caldariomyces* (?) *fumago*, cultural study on, 60.

*Calendula*, tomato spotted wilt affecting, in England, 763.

— *officinalis*, *Bacterium formosanum* can infect, 738.

— —, *Entyloma calendulae* on, 654.

— —, tomato spotted wilt affecting, in Western Australia, 129.

Calico disease of potato in U.S.A., 786.

*Callistephus chinensis*, see Aster, China.

*Calluna vulgaris*, asymbiotic germination of, 247.

Calo-clor, constituents of, 562.

—, use of, against *Corticium fuciforme* on turf, 562; against *Rhizoctonia* on *Agrostis*, 562.

Calomel, see Mercurous chloride.

*Calonectria graminicola* on rye, control, 20, 21, 380; occurrence in Germany, 20; in Sweden, 21.

— — on turf in Great Britain, 588.

— — var. *neglecta* on rye and wheat in U.S.S.R., 297.

*Calopogonium*, *Cercospora cruenta* on, 280.

*Camarosporium* in the Arctic atmosphere, 461.

*Camellia oleifera*, *Exobasidium camelliae-oleiferae* on, in Japan, 532.

— *sinensis*, see Tea.

*Campanula*, tomato spotted wilt can infect, 404.

— *persicifolia*, *Phytophthora* on, in U.S.A., 147.

*Camphor* (*Cinnamomum camphora*), (?) *Stilbum* on, in Tanganyika, 13.

*Canavalia ensiformis*, *Sphaceloma* on, in Uganda, 82.

*Candida*, allergic reaction to, in guinea-pigs, 306, 307, 582.

—, classification of, 444, 582.

— on man, type of mycosis caused by, 631.

— *albicans*, differentiation of, 444.

— — on man, 100; (?) in U.S.A., 631, 632.

— —, serological reaction of, 34, 444.

— *bronchialis* on man in Italy, 509.

— *krusei*, differentiation of, 444.

— —, toxicity of dyes and metallic salts to, 583.

— *macedoniensis* on man in China, 308.

— *montpellieri* on man in Algeria, 168.

— *mycotoruloidea*, allergic reaction to, 307; pathogenicity of, to guinea-pigs, 306.

— *parapsilosis*, differentiation of, 444; serological reaction to, 34, 444.

— *pinoyi* on man in China, 308; in Italy, 509; toxicity of dyes and metallic salts to, 584.

— *psilosporia*, differentiation of, 444.

— *tropicalis*, toxicity of benzoic acid and iodine to, 759; of phenol derivatives to, 105, 584, 759; of salicylic acid, sodium hypochlorite, and sodium thiosulphate to, 759.

— *vulgaris*, differentiation of, 444.

— — in Italian leavens, 383.

— —, serological reaction of, 34, 444.

— —, viability of, 648.

Canker of poplar in Belgium, 478; in England and Scotland, 264.

*Cannabis sativa*, see Hemp.

*Cantaloupe* (*Cucumis melo*), curly top of, in U.S.A., 339.

—, *Sclerotium* on, in U.S.A., 221.

*Capitophorus fragariae* transmitting strawberry yellow edge, 179, 596.

*Capnodium*, culture of, 60.

(?) — on sugar-cane in the Argentine, 531.

— *citricolum*, mixture of fungi comprising, 60.

— *salicinum*, see *Teichospora salicina*.

*Capsella bursa-pastoris* var. *auriculata*, *Cystopus candidus* var. *microspora* on, in Japan, 2.

*Capsicum annuum*, *C. frutescens*, see Chilli.

— *minimum*, tobacco virus I can infect, 197.

Carbolineum, proposed standardization of, in Switzerland, 597.

—, use of, against *Ceratostomella ulmi* on elm, 476; against *Venturia inaequalis* on apple and *V. pirina* on pear, 590; as a timber preservative, 138.

Carbon bisulphide, use of, in soil disinfection, 460.

— dioxide, effect of, on low temperature breakdown and soft scald of apples, 41. (See also Gas storage.)

Card process of timber preservation, 545.

*Cardamine flexuosa*, *Cystopus candidus* var. *microspora* on, in Japan, 2.

*Carica papaya*, see Papaw.

Carnation (*Dianthus caryophyllus*), *Alternaria dianthi* on, in U.S.A., 684.

—, *Fusarium culmorum* on, in England, 636.

—, — *poae* on, in Germany, 512; symbiotic association between *Pediculoides dianthophilus* and, 512.

—, *Phytonomas woodsii* on, in U.S.A., 365.

—, *Phytophthora* on, in U.S.A., 147.

—, *Verticillium cinerecens* on, in England, 636.

*Carnegiea gigantea*, *Bacterium tumefaciens* on, in U.S.A., 39.

Carrot (*Daucus carota*), *Actinomyces* on, in Sweden, 340.

—, aster yellows can infect, 312, 313.

—, *Bacterium formosanum* can infect, 738.

—, celery yellows can infect, 313.

—, *Chalaropsis thielavioides* on, in England, 408, 801.

—, *Corticium solani* on, toxic action of, 603.

—, *Helicobasidium purpureum* can infect, 730.

—, *Macrosporium carotae* on, in Bermuda and U.S.A., 560; sporulation of, 399.

—, *Phytophthora megasperma* on, in Tasmania, 211.

—, *Pseudomonas carotae* on, in U.S.A., 211.

—, *Pythium ultimum* can infect, 606.

— yellows in U.S.A., 312, 313; transmission of, by *Cicadula sexnotata*, 312; by *Thamnotettix geminatus*, 313; to aster, 312.

*Carthamus tinctorius*, see Safflower.

*Carya*, see Hickory.

— pecan, see Pecan.

Carvacrol, toxicity of, to dermatophytes, 105.

Casein as a spreader, 164, 767, 769. (See also Calcium caseinate.)

Cassava (*Manihot utilissima*, *M. dichotoma*), *Fomes lignosus* on, in Malaya, 81.

— mosaic in the Gold Coast, 146, 217; in Sierra Leone, 428; in Tanganyika, 146; transmission of, by Aleyrodidae, 146; varietal resistance to, 146, 217, 428.

—, *Oidium manihotis* on, in Brazil, 87.

—, *Ragnhildiana manihotis* on, in the Ivory Coast, 396.

*Cassia floribunda*, (?) *Stilbum* on, in Tanganyika, 13.

*Castanea*, see Chestnut.

Castor, see *Ricinus communis*.

*Casuarina*, *Phymatotrichum omnivorum* on, in U.S.A., 562.

Catechol, toxicity of, to *Aspergillus niger*, *Botrytis allii*, *Colletotrichum circinans*, and *Gibberella saubinetii*, 553.

*Catenaria* on *Panicum variegatum* in U.S.A., 259.

*Cathormion altissimum*, *Fomes yucatanensis* on, in Sierra Leone, 428.

Cattle, *Aspergillus fumigatus* and *A. niger* on, in U.S.A., 511.

—, *Balansia* poisoning, in India, 630.

—, *Mucor pusillus* and *Rhizopus cohnii* on, in U.S.A., 511.

—, *Trichophyton gamelleirae* on, in Brazil, 759.

—, — *papillosum* on, in Morocco and Syria, 104.

—, — *villosum* on, in French Indo-China, 104.

Cauliflower (*Brassica oleracea*), *Alternaria oleracea* on, in Burma, 286; in Canada, 494; in U.S.A., 340.

—, *Peronospora parasitica* on, in U.S.A., 546.

—, *Phoma lingam* on, in New Zealand, 547.

—, *Plasmodiophora brassicae* on, in England and Wales, 2; in Germany, 545.

—, *Pseudomonas campestris* on, in Bulgaria, 1.

—, tomato spotted wilt affecting, 404; in England, 763.

—, virus disease of, in U.S.A., 207; transmission of, to cabbage, kale, and *Matthiola incana*, 207.

*Cedrus libani* var. *deodara*, see Deodar.

Celeriac, see Celery.

Celery (*Apium graveolens*), aster yellows can infect, 171, 312, 313.

—, *Bacillus carotovorus* on, note on, 343; occurrence in Canada, 343; in England, 730; in Italy, 142; in U.S.A., 343; study on, 142; synonymy of, 143.

—, *Bacterium jaggeri* on, 16.

—, blackheart of, in Canada and U.S.A., 343.

—, *Cercospora apii* on, control, 343, 563; factors affecting, 74, 343; occurrence in the Philippines, 343; in U.S.A., 74, 563.

— diseases, control, 277.

—, *Fusarium* on, factors affecting, 142; occurrence in U.S.A., 142, 148, 418, 737; taxonomy of, 418; varietal resistance to, 142, 498.

—, — *apii* and *F. apii* var. *pallidum* on, 419.

— mosaic in U.S.A., 498; transmission of, by *Aphis gossypii* and other aphids, 498. (See also Celery virus 1.)

—, *Mucor hiemalis* on, in Europe, 655.

—, *Pythium ultimum* on, in U.S.A., 383.

—, *Septoria apii* on, in Norway, 258; in U.S.A., 563; synonym of *S. apicula*, 258.

—, — *apii-graveolentis* on, in the Philippines, 343.

—, *Thielaviopsis basicola* on, in England and Wales, 492.

[Celery], tomato spotted wilt can infect, 404.

— virus 1 can infect beet, broad bean, 5; *Chenopodium murale*, 615; *Commelinia nudiflora*, cowpea, 5; cucumber, 5, 112; *Datura*, 615; *D. stramonium*, 5; *Emilia sagittata*, 5; *Euchlaena mexicana*, 93; *Nicotiana glutinosa*, 5; *Phacelia whitavia*, 5; *Physalis*, 5; rye and sorghum, 93; *Tagetes patula*, 5; tobacco, 5, 660; tomato, 5; wheat, 93; *Zinnia elegans*, 5.

— — — on *Ambrosia artemisi-faba* in U.S.A., 615.

— — — on *Ambrosia elatior* in U.S.A., 553.

— — — on *Antirrhinum majus* in U.S.A., 615.

— — — on banana in U.S.A., 112, 615.

— — — on bean and beet in U.S.A., 615.

— — — on celery in Cuba, 93; in U.S.A., 4, 93, 553, 615; studies on, 4, 93, 553, 615.

— — — on chilli in Cuba, 93; in U.S.A., 4, 553, 615.

— — — on *Commelinia communis* in Cuba, 93; in U.S.A., 615.

— — — on *Commelinia nudiflora* in Cuba, 93; in U.S.A., 93, 112, 553, 615.

— — — on cucumber in Cuba, 93; in U.S.A., 615.

— — — on *Cucumis anguria* in U.S.A., 615.

— — — on cucurbits in U.S.A., 4.

— — — on *Delphinium consolida*, eggplant, *Emilia sagittata*, *Euchlaena mexicana*, *Geranium carolinianum*, and lily in U.S.A., 615.

— — — on maize (?) in Hawaii, 94; in U.S.A., 93, 553, 615.

— — — on marigold, onion, *Pelargonium*, *Petunia hybrida*, *Physalis*, *P. alkekengi*, *P. pubescens*, rye, sorghum, and spinach in U.S.A., 615.

— — — on squash in Cuba, 93; in U.S.A., 553, 615.

— — — on sweet potato in Cuba, 93, 615; in U.S.A., 615.

— — — on *Tetragonia expansa* and tobacco in U.S.A., 615.

— — — on tomato in Cuba, 93; in U.S.A., 615.

— — — on vegetable marrow, *Vinca rosea*, watermelon, wheat, and *Zinnia elegans*, in U.S.A., 615.

— — — properties of, 4.

— — — transmission of, by *Aphis gossypii*, 4, 93, 112, 554; by *A. maidis*, 112; by sap, 4.

— — — vegetables immune from, 615.

— — — see also Celery mosaic.

— yellows in U.S.A., 312, 313, 737; study on, 737; transmission of, by *Thamnotextix montanus*, 313; to aster, 312, 313; carrot, lettuce, mustard, *Plantago major*, and *spinacia*, 313; varietal resistance to, 737.

Cellulose, decomposition of, by soil fungi, 332, 585.

— effect of, on soil microrgan., 392.

*Cenangium abietis* on pine in Germany, 476.

*Centaurea scabiosa*, *Puccinia verruca* on, in U.S.S.R., 494.

*Centrosema plumieri*, *Nematospora coryli* and *N. gossypii* on, in the Belgian Congo, 507.

*Cephaelurus minimus* on cacao in the British Empire, 87.

— *mycoidea* on cacao, control, 566.

— *parasiticus* on cacao in the British Empire, 87.

— (?) — on coffee in the Cameroons, 31.

*Cephalosporium* in eggs in France, 237.

— on elm in U.S.A., 203, 406.

— on rice in India, 80.

— stage of *Ceratostomella piceae*, 804; of *Ophiostoma* spp. of the *brevirostrata* section, 274.

— toxicity of phenol derivatives to, 105.

— *acremonium* can infect tomato, 405.

— on man in Hungary, 695.

— *cerebriforme* can infect tomato, 405.

— *costantinii* on mushrooms in Great Britain, 346.

— *gruetzii* can infect tomato, 405.

— *lamellaecola* on mushrooms in Great Britain, 346.

— *lecanii*, control of *Lecanium viride* and other scale insects by, in the Seychelles, 305.

— — — on *Lecanium persicae*, *Mesolecanium deltae*, and *Saissetia oleae* in the Argentine, 98.

— *recifei* on man in Brazil, 170.

— *serrae* on man in Italy, 36; synonymy of, 36.

— *stuehmeri* synonym of *C. serrae*, 36; not accepted, 761.

*Ceratostoma pirinum* referred to *Ophiostoma pirina*, 703.

*Ceratostomella* on *Platanus* in U.S.A., 408.

— on timber in U.S.A., 612.

— on wood, pulp in Norway, 140; in Scandinavia, 545.

— *acoma* on timber in U.S.S.R., 271, 273.

— *adiposa* renamed *Ophiostoma adiposum*, 274.

— — — renamed *Endoconidiophora adiposa*, 729.

— *buxi* on box in U.S.S.R., 62.

— *cana* renamed *Ophiostoma canum*, 274.

— *castaneae* renamed *Ophiostoma castaneae*, 274.

— *catoniana*, see *Ophiostoma catonianum*.

— *coerulea*, *C. pilifera* regarded as co-specific with, 137.

— on timber, control, 270; latent infection by, 273; occurrence in U.S.S.R., 270, 273; in Victoria, 137.

— — — renamed *Ophiostoma coeruleum*, 274.

— *comata* on timber in U.S.S.R., 271, 273.

— *exigua* renamed *Ophiostoma exiguum*, 274.

— *fagi* renamed *Ophiostoma fagi*, 274.

— *fimbriata* on *Hevea* rubber in Java, 743; in Malaya, 791.

— — — on sweet potato in U.S.A., 118, 253.

— — — renamed *Ophiostoma fimbriatum*, 274.

— *imperfecta* on timber, control, 270;

*Haplographium (?) bicolor* conidial stage of, 272; occurrence in U.S.S.R., 270, 272, 273; study on, 273.

[*Ceratostomella*] *ips* on pine in U.S.A., 68; *Dendroctonus frontalis* and *Ips* spp. in relation to, 68.

— on timber in U.S.A., 138, 729; transmission of, by *Ips grandicollis* and *I. pini*, 138.

— renamed *Ophiostoma ips*, 274.

— *lignorum* renamed *Ophiostoma lignorum*, 703.

— *major* in the air in Holland, 471.

— renamed *Ophiostoma majus*, 703.

— *merolinensis* renamed *Ophiostoma merolinense*, 274.

— *minor* renamed *Ophiostoma minus*, 274.

— *multiannulata* on timber in U.S.A., 729.

— *obscura* on timber in U.S.A., 729.

— *paradoxa* on banana in Australia, 517.

— on coco-nut in Ceylon, 145.

— on date palm in Tunis, 429; in U.S.A., 561.

— on pineapple in Hawaii, 455.

— on sugar-cane in Natal, 470.

— renamed *Endoconidiophora paradoxoza*, 729; *Ophiostoma paradoxum*, 274.

— *penicillata* renamed *Grosmania penicillata*, 703.

— *picea* on pine and spruce in Japan, 804; in U.S.S.R., 68.

— on timber, *Cladosporium* a stage of, 804; occurrence in Japan, 804; in U.S.S.R., 270, 273.

— renamed *Ophiostoma piceae*, 274.

— *pilifera* on timber in U.S.A., 729.

— regarded as a form of *C. coerulea*, 137.

— sensu Hedgec. renamed *Ophiostoma piliferum*, 274.

— *pini* on pine, *Dendroctonus frontalis* and *Ips* spp. in relation to, 68; occurrence in Japan, 275; in U.S.A., 68.

— on spruce in U.S.S.R., 68.

— on timber, control, 270; factors affecting, 276; latent infection by, 273; occurrence in Japan, 275; in U.S.S.R., 270, 273.

— renamed *Ophiostoma pini*, 274.

— *pluriannulata* on timber in U.S.A., 729.

— renamed *Ophiostoma pluriannulatum*, 274.

— *quercus* renamed *Ophiostoma quercus*, 274.

— *stenoceras* renamed *Ophiostoma stenoceras*, 274.

— *ulmi* on elm, control, 63, 64, 134, 203, 476, 536, 665; factors affecting, 536; legislation against, in England, 735; in U.S.A., 336, 480; notes on, 203, 406; occurrence in Austria and Belgium, 264; in Bulgaria, 264, 537; in Czechoslovakia, 264, 536; in England, 104; in France, 133, 264; in Germany, 264, 476, 536; in Holland, 264, 664; in Hungary, 264; in Italy, 133, 264, 664; in Jugo-Slavia, (?) Poland, and Portugal, 264; in Rumania, 215, 264; in Switzerland, 264; in U.S.A., 63, 64, 203, 264, 338, 406, 476, 480, 537, 663; in various countries, 664; *Pseudotarsonemoides innumerabilis* in relation to, 665; sporulation of, 134, 406; studies on, 134, 406, 536, 664; transmission of, by air currents, 611; by bark beetles, 336; by *Hylurgopinus rufipes*, 476; by mites, (?) 63, 476; by *Scolytus affinis*, 537; by *S. multistriatus*, 133, 264, 536, 665; by *S. pygmaeus*, 536; by *S. scolytus*, 536, 665; by *S. sulcifrons*, 133, 264, 537; varietal resistance to, 133, 536, 664, 665, 726.

[*Ceratostomella ulmi*] on plum in Italy, record of, not accepted, 374, 800.

— renamed *Ophiostoma ulmi*, 274.

*Cercoseptoria balsaminae* on *Impatiens balsamina* in India, 470.

*Cercospora* on hemp in India, 80.

— on *Chrysanthemum coronarium* in Java, 743.

— on sugar-cane in Uganda, 793.

— on swedes in Wales, 808.

— *althaeina*, conidial production of, in culture, 195.

— on cotton in the Philippines, 755.

— on hollyhock in Japan, 471.

— *apii* on celery in the Philippines, 343; in U.S.A., 74, 563.

— *arachidicola* on groundnut in Uganda, 82.

— *aviculalis*, conidial production by, 195.

— *beticola*, conidial production by, 195.

— on *Amaranthus retroflexus* in U.S.A., 149.

— on beet, control, 488, 813; note on, 149; occurrence in Austria, 813; in Europe, 548; in U.S.A., 149, 220, 488; overwintering of, 220.

— on *Chenopodium album*, lettuce, *Malva rotundifolia*, *Melilotus alba*, and *Polygonum convolvulus* in U.S.A., 149.

— *bliti* synonym of *C. rubi*, 775.

— *canescens* on bean in Brazil, 87.

— *capsici* on chilli in Bermuda, 560; in U.S.A., 344.

— *cofficola* on coffee in the Cameroons, 31; in Venezuela, 397.

— *concors* on potato in Denmark, 741.

— *cordobensis* on sweet potato in Brazil, 87.

— *cruenta* on bean and *Calopogonium*, 280.

— on cowpea, conidial production by, 195; *Mycosphaerella cruenta* perfect stage of, 281; occurrence in Brazil, 87; in U.S.A., 195, 280; study on, 280.

— on *Phaseolus aureus* and *Vigna unguiculata*, 280.

— *dubia* on *Chenopodium album* in U.S.A., 195.

— *epicoccoides* on *Eucalyptus globulus* in Japan, 471.

— *fabae* on bean in Italy, 681.

— *formosana* on *Lantana camara* and *L. micta* in Japan, 471.

— *fukuii* on *Boehmeria frutescens* var. *concoloris* in Japan, 471.

— *fukushiana* on *Impatiens balsamina* in Japan, 472.

— *garbiniana* (?) synonym of *C. rubi*, 775.

— *gossypina* on cotton in U.S.A., 629.

[*Cercospora*] *grandissima* on artichoke in Brazil, 87.

— on *Dahlia variabilis* in Japan, 472.

— *ixorae* on *Ixora chinensis* in Japan, 472.

— *kopkei* on sugar-cane in Burma, 81; in Japan, 396; in Java, 153.

— *longipes* on sugar-cane in Brazil, 87; in U.S.A., 257.

— — on sugar-cane  $\times$  sorghum hybrids in U.S.A., 258.

— *longissima* on lettuce in Japan, 472.

— *mangiferae* on mango in Japan, 472.

— *mirabilis*, *C. moricola*, and *C. muhlenbergiae*, conidial production by, 195.

— *musae* on banana in Fiji, 44; in Queensland, 216; in Trinidad, 45; studies on, 44, 45.

— *nerii-indici* on *Nerium indicum* in Japan, 472.

— *nicotianae* on tobacco, control, 200, 261, 425; occurrence in Australia, 425; in Ceylon, 261; in Rhodesia, 200, 678; in Sumatra, 473; in Tanganyika, 60.

— *personata* on *Arachis* spp. and groundnut in Brazil, 212.

— *physalidis* on *Physalis* in U.S.A., 195.

— *psidii* synonym of *C. sawadae*, 472.

— *rubi* on blackberry, dewberry, raspberry, and other *Rubus* spp. in U.S.A., 774; *Mycosphaerella dubia* perithecial stage of, 775; synonymy of, 775.

— *rubicola* may be synonym of *C. rubi*, 775.

— *sawadae* on guava in Japan, 472; *C. psidii* synonym of, 472.

— *septorioides* synonym of *C. rubi*, 775.

— *selariae* on *Setaria glauca* in U.S.A., 195.

— *solanicola* on potato in Brazil, 87.

— *sorgii* on sorghum in Burma, 286.

— *taiwanensis* on sugar-cane in Japan, 396.

— *traversiana* in *Trigonella foenum-graecum* in Burma, 286; in Estonia, 529.

— *ubi* on yams in Japan, 472.

— *zebrina* on *Melilotus alba* in U.S.A., 195.

— — on *Melilotus indica* in U.S.A., 639.

— *zonata* on bean in Cyprus, 83; in Italy, 681.

*Cercosporaella cylindrospora* on groundnut in France, 213.

— *herpotrichoides* can infect *Hordeum*, oats, and wheat, 503.

— — on *Agropyron inerme* and *A. riparium* in U.S.A., 569.

— — on barley in U.S.A., 230.

— — on *Bromus tectorum* in U.S.A., 569.

— — on cereals in France, 26; in Germany, 351.

— — on *Koeleria cristata* in U.S.A., 569.

— — on oats, resistance to, 230.

— — on *Poa sandbergii*, in U.S.A., 569.

— — on rye in U.S.A., 230.

— — on wheat, control, 230, 351, 570, 748; factors affecting, 230, 236, 351, 570, 748; note on, 689; occurrence in France, 424, 502; in Germany, 230, 351, 570, 748; in U.S.A., 230; varietal resistance to, 230.

*Cercosporina lappae* on *Arctium lappa* in Japan, 284.

Cereal diseases, breeding against, in Canada, 349; in Oregon, 744.

Ceresan, effect of, on metals and vice versa, 597; on wheat germination, 558.

— injury, 688.

—, use of, against barley diseases, 503; against *Calonectria graminicola* on rye, 20; against cereal diseases, 21, 156; against *Colletotrichum lini* on flax, 763; against *Corticium solani* on beet, 809; against *Fusarium* on bean, 207; against *F.* on China aster, 172; against *F. culmorum* on barley, oats, and wheat, 688; against *F. lini* on flax, 763; against *Helminthosporium gramineum* on barley, 20; against *H. sativum* on barley, 299, 688; on oats and wheat, 688; against *H. teres* on barley, 159; against *Phoma betae* and *Pythium de Baryanum* on beet, 809; against *Tilletia caries* and *T. foetens* on wheat, 20, 287; against *Ustilago avenae* on oats, 20, 572; against *U. bromivora* on *Bromus unioloides*, 572; against *U. hordei* on barley, 572; against *U. kolleri* on oats, 572; against vegetable diseases, 277.

—, new improved, composition of, 745.

—, —, —, injury, 688.

—, —, —, use of, against *Bacterium malvacearum* on cotton, 221; against *Fusarium culmorum* and *Helminthosporium sativum* on barley, oats, and wheat, 688; against *Tilletia caries* and *T. foetens* on wheat, 745; against *Ustilago avenae* on oats, 745; against *U. hordei* on barley, 745; against *U. kolleri* on oats, 745.

— (U.S.A.), see Granosan.

— U. 564, use of, against *Calonectria graminicola* on rye, 20; against *Helminthosporium gramineum* on barley, 20, 27; against *Plasmodiophora brassicae* on cabbage and cauliflower, 546; against *Ustilago avenae* on oats, 20; against *U. nuda* on barley, 27; against wheat bunt, 20.

— U.T. 1875 A, use of, against *Corticium solani*, *Phoma betae*, and *Pythium de Baryanum* on beet, 809.

*Cereus peruvianus*, *Sporotrichum cactorum* on, in Italy, 765.

— *senilis*, *Bacterium cacticorum* on, in Italy, 765.

—, (?), *Fusarium dianthi* on, in Italy, 636.

Cerium, effect of, on *Bacterium tumefaciens* and *Ricinus*, 647.

— compounds, use of, as fungicides, 244.

*Cerotellium desmum* on cotton in Cuba, Porto Rico, and U.S.A., 629.

— fici on fig in India, 560.

*Cestrum parqui*, virus disease of, in Italy, 781.

*Chaetoceratostoma* transferred to *Ophiostomella*, 703.

*Chaetocnema pulicaria*, overwintering of *Aplanobacter stewarti* in, in U.S.A., 94, 753.

*Chaetomium* in eggs in France, 237.

- *olivaceum* on mushrooms in Great Britain, 345.
- Chaetoplea* accepted as a genus, 125.
- Chalaropsis thieliaviooides* on carrot in England, 408, 801.
- — on elm in U.S.A., 726.
- — on peach and walnut in England, 408, 801.
- Chamaecyparis lawsoniana*, (?) *Monochae-tia* on, in U.S.A., 205.
- Charcoal base rot of oil palm in Malaya, 81.
- Cheiranthus*, tomato spotted wilt can infect, 404.
- *allioni*, *Peronospora parasitica* can infect, 546.
- *cheiri*, see Wallflower.
- Chemical constitution in relation to fungicidal activity, 244; to toxicity of phenol derivatives to fungi, 105.
- Chenopodium album*, *Cercospora beticola* on, in U.S.A., 149.
- — — *dubia* on, in U.S.A., 195.
- *murale*, celery virus 1 can infect, 615.
- Cherry (*Prunus avium* and *P. cerasus*), *Bacterium pruni* on, in U.S.A., 178, (?) 220.
- buckskin disease of, in U.S.A., 111.
- *Coccomyces hiemalis* on, control, 150, 381, 497, 706; factors affecting, 376; occurrence in U.S.A., 150, 178, 376, 381, 455, 497, 706; variation in, 376, 455.
- *Coniothyrium* on, in Canada, 44, 177.
- *Dibotryon morbosum* on, control, 773; *Hormodendrum* stage of, 593, 772; occurrence in Canada, 43, 177, 593, 772; overwintering of, 43; studies on, 177, 593, 772.
- disease control in U.S.A., 768.
- *Glomerella cingulata* can infect, 40.
- leptonecrosis of, in Italy, 454; (?) a virus disease, 455.
- *Monilia oregonensis* on, in Canada, 495.
- mosaic of, control, 316; occurrence in Bulgaria, 316, 368; (?) in Canada, 494; in Czecho-Slovakia, England, Holland, and U.S.A., 368; transmission of, by budding, 368; to peach and plum, 368.
- moulds on stored, in U.S.A., 322.
- 'pink cherry' disease of, in U.S.A., may be due to a virus, 288.
- *Pseudomonas cerasi* on, 16.
- *Sclerotinia fructicola* on, in Canada, 495; in S. Australia, 559.
- — *laxa* on, control, 703, 705; notes on, 705; occurrence in Canada, 495; in Italy, 705; in Tasmania, 703.
- *Taphrina cerasi* on, in Germany, legislation against, 736.
- *Venturia cerasi* on, in Germany, 317, 589.
- Cheshunt compound, use of, against *Phytophthora* (?) *parasitica* on *Solanum capsicastrum*, 637; against *Pythium* on tea, 84.
- Chestnut (*Castanea*), 'browning' of, fungus causing, in England, 137.
- *Endothia parasitica* on, breeding against, 611; control, 727; occurrence in U.S.A., 611, 726, 800; regeneration of stands depleted by, 800; varietal resistance to, 611.
- *Guignardia aesculi* on, in U.S.A., 203.
- moulding in Italy, 801.
- *Mucor* and *Penicillium* on, in Italy, 801.
- *Phytophthora cambivora* on, in England, 264; in Italy, 680.
- — *cinnamomi* on, in England, 264; in U.S.A., 147.
- *Polyporus sulphureus* on, in U.S.S.R., 62.
- *Poria subacida* on, in U.S.A., 805.
- *Rhacodiella* on, in Italy, 801.
- *Trichothecium* on, in Italy, 801.
- Chick pea, see *Cicer arietinum*.
- Chicory (*Cichorium intybus*), *Bacterium formosanum* on, in Japan, 738.
- *Entyloma cichorii* on, in Poland, 398.
- *Pseudomonas* (?) *intybi* can infect, 418.
- Chilli (*Capsicum annum*), *Actinomyces totschidlowskii* on, in Rumania, 215.
- *Alternaria capsici-annui* on, in Rumania, 215.
- *Bacterium vesicatorium* on, legislation against, in Cuba, 400; occurrence in U.S.A., 344.
- blossom-end rot (non-parasitic) in U.S.A., 344.
- *Brachysporium capsici*, *B. ovoideum*, and *B. senegalense* on, in Japan, 344.
- — — tomato on, in Japan, 344; *Helminthosporium* *tomato* renamed, 344.
- celery virus 1 on, in Cuba, 93; in U.S.A., 4, 553, 615; transmission of, by *Aphis gossypii*, 554.
- *Cercospora capsici* on, in Bermuda, 560; in U.S.A., 344.
- *Colletotrichum capsici* on, in the Argentine, 15; in U.S.A., 344.
- *Corticium solani* on, in U.S.A., (?) 151, 344.
- curly top of, in U.S.A., 339.
- damping-off in U.S.A., 671.
- *Fusarium* on, in India, 80.
- — *annuum* on, in U.S.A., 7.
- — *scirpi* var. *caudatum* on, in the Argentine, 720.
- *Glomerella cingulata* on, in the Argentine, 15; in U.S.A., 344.
- internal fruit mould of, in U.S.A., 344.
- mosaic in Denmark, 78; in U.S.A., 344; virus of (?) affecting *Myosotis* in Denmark, 78.
- *Oidiopsis taurica* on, in Ceylon, 146.
- *Peronospora* on, in U.S.A., 344.
- — *tabacina* can infect, 723.
- *Phytophthora capsici* on, in U.S.A., 222.
- potato calico can infect, 787.
- (?) *Pythium* on, in U.S.A., 151, 563.
- — *aphanidermatum* can infect, 7.
- — *ultimum* on, in U.S.A., 383.
- *Rhizoctonia* on, in U.S.A., 563.
- *Sclerotium rolfsii* on, in U.S.A., 344.

[*Chilli*], tobacco mosaic can infect, 198; inheritance of ability to localize virus of, 126.  
 —, — virus 1 on, 197; in U.S.S.R., 130.  
 —, tomato bunchy top can infect, 800.  
 —, — spotted wilt affecting, in U.S.A., 201.  
 —, virus disease of, in Rumania, 215.  
*Chinosol*, see *Quinosol*.  
*Chironomids*, *Typhella* on, 630.  
*Chives*, see *Allium schoenoprasum*.  
*Chlidanthus fragrans*, *Stagonospora curtissii* can infect, 448.  
*Chloride* of lime a component of eusol, 754.  
 —, —, use of, against *Gloeoedes pomigena*, 452; against grape wastage, 491; against lettuce diseases, 673.  
*Chlorinated phenols*, use of, against blue stain of timber in Finland, 729.  
*Chlorosis* of *Aleurites montana* in U.S.A., 481.  
 — of citrus in U.S.A., 561, 753.  
 — of coffee in E. Africa, 755.  
 — of grapefruit in Palestine, 753.  
 — of jasmine in Bulgaria, 462.  
 — of narcissus in England, 366.  
 — of orange in U.S.A., 481.  
 — of peach in S. Africa, 319.  
 — of pepper in Sumatra, 152.  
 — of rose in England, 313.  
 — of tobacco caused by sulphur deficiency, 610; by manganese excess, 534; occurrence in Italy, 534; in U.S.A., 534, 610.  
 — of tomato in U.S.S.R., 131.  
 — of vine in France, 214.  
 —, infectious, of apple, see *Mosaic*.  
 —, —, of orange, 505. (See also *Mosaic*.)  
 —, —, of pear and quince, see *Mosaic*.  
*Chlorothymol*, toxicity of, to *Candida tropicalis*, 759; to dermatophytes, 105.  
*Chlorotic streak* of sugar-cane, see *Fourth disease* of.  
*Choaenophoroidea cucurbitae* on squash in Japan, 498.  
*Chocolate spot* of bean, see *Botrytis* and *B. (?) fabae* on.  
*Cholodny* technique for the study of soil fungi, 469.  
*Chromium* compounds, use of, as fungicides, 244.  
 — fluoride, use of, against wool moulding, 763.  
*Chrysanthemum*, (?) *Bacterium tumefaciens* on, in England, 635.  
 —, tomato spotted wilt affecting, in England, 763.  
 — *cinerariifolium*, *Sclerotium rolfsii* on, in Java, 743.  
 — (?) *coccineum*, *Phytophthora* and *Pythium* on, in U.S.A., 222.  
 — *coronarium*, *Bacterium formosanum* can infect, 738.  
 —, — *Cercospora* on, in Java, 743.  
 — *frutescens*, *Bacterium tumefaciens* on, gall formation by, 565; serological study on, 430.  
 — *indicum*, *Pseudomonas syringae* on, in Germany, 38, 418.  
*Chrysomphalus aurantii*, *Myriangium duariae* on, in the Argentine, 98.  
 —, — *Sphaerostilbe coccophila* on, in the Argentine, 98.  
*Chrysomyza rhododendri* on rhododendron in Germany, 174.  
*Ciboria aestivalis* on apple, apricot, peach, pear, plum, and quince in New S. Wales, 704; (?) parasitic on *Sclerotinia fructicola*, 704; *Sclerotinia aestivalis* renamed, 704.  
*Cibotium schiedei*, *Pestalozzia* on, in U.S.A., 152.  
*Cicadellid*, *Metarrhizium brunneum* on a, in the Philippines, 443.  
*Cicadula sexnotata*, transmission of aster yellows by, in U.S.A., 171, 312, 313; of carrot yellows by, in U.S.A., 312.  
*Cicadulina mbila* and *C. zea*, transmission of maize streak by, in Tanganyika, 146.  
*Cicer arietinum*, *Ascochyta rabiei* on, in Rumania, 215.  
*Cichorium endivia*, see *Endive*.  
 — *intybus*, see *Chicory*.  
*Cicinnobella ampullula* a parasite of *Melolita dubia*, 793.  
 —, — *Asbolisia ampullula* referred to, 793.  
*Cineraria* (*Senecio cruentus*), *Bacterium tumefaciens* can infect, 499.  
 —, tomato spotted wilt virus affecting, in U.S.A., 201.  
*Cinnamomum camphora*, see *Camphor*.  
*Cinnamon* (*Cinnamomum zeylanicum*), *Phytophthora cinnamomi* on, 194.  
*Circinella* in soil, distribution in Europe, 655.  
*Cirsium arvense*, *Puccinia suaveolens* on, in U.S.S.R., 52.  
*Citric acid*, production of, by *Aspergillus*, 604; by *A. niger*, 603; by moulds, 52.  
*Citromyces pfefferianus* in pharmaceutical preparations in Denmark, 114.  
 —, longevity of, 649.  
*Citron* (*Citrus medica*), *Sporotrichum citri* on, in Java, 742.  
*Citrullus vulgaris*, see *Watermelon*.  
*Citrus*, *Alternaria citri* on, in U.S.A., 628.  
 —, *Amillaria mellea* on, in Malta, 618.  
 — bronzing in U.S.A., 442.  
 — chlorosis in U.S.A., 561, 753.  
 —, *Colletotrichum gloeosporioides* on stored, control, 628; ethylene in relation to, 755; occurrence in Sierra Leone, 428; in S. Africa, 755; in U.S.A., 628.  
 —, concentric ring blotch of, in Tanganyika, 679.  
 —, *Corticium salmonicolor* on, in Ceylon, 146.  
 —, — *solani* on, in U.S.A., 188.  
 —, crinkly leaf of, suspected virus nature of, 505.  
 — decay, control, 450.  
 —, *Diaporthe* on, in U.S.A., 96.  
 —, — *citri* on, control, 96, 693; occurrence in U.S.A., 96, 564, 693.  
 —, *Diplodia* on, in U.S.A., 564.  
 —, — *natalensis* on stored, factors affecting, 86, 564; occurrence (?) in Sierra Leone, 428; in U.S.A., 86, 564.

[*Citrus*] diseases, control in Morocco, 517; legislation against, in U.S.S.R., 816.  
 — exanthema in U.S.A., 628; suspected virus nature of, 505.  
 —, *Fusarium moniliforme* var. *majus* on stored, in Sierra Leone, 428.  
 —, *Gibberella fujikuroi* var. *subglutinans* on stored, in Sierra Leone, 428.  
 —, *Gloeosporium limetticolum* on, suspected virus nature of disease caused by, 505.  
 —, June drop of, in Cyprus, 691.  
 —, *Limacinia citri* on, legislation against, in Spain, 480.  
 —, little leaf of, in U.S.A., 768; suspected virus nature of, 505.  
 —, *Macrophomina phaseoli* on, in U.S.A., 670.  
 —, mottle leaf, control, 506; occurrence (?) in India, 81; in U.S.A., 506, 628; studies on, 302, 628.  
 —, moulds in England, 450.  
 —, *Mucor racemosus* on, 236.  
 —, *Neotria haematoxocca* on, in Java, 742.  
 —, *Nematospora coryli* on, in U.S.A., 86.  
 —, *gossypii* can infect, 86.  
 —, *Oidium tingitaninum* on, in Java, 153.  
 —, *Oospora citri-aurantii* on, in Sierra Leone, 428.  
 —, *Penicillium digitatum* on, in Sierra Leone, 428; in U.S.A., 628.  
 —, — *italicum* on, in U.S.A., 628.  
 —, *Phytophthora citrophthora* on, in U.S.A., 628; in Western Australia, 315.  
 —, — *hibernalis* on, in Western Australia, 315.  
 —, *Pseudomonas citri* on, control, 64, 145; legislation against, in Egypt, 544; in U.S.A., 64; non-occurrence in S. Africa, 426; occurrence in Ceylon, 145; in U.S.A., 64.  
 —, — *citriputale* on, legislation against, in Egypt, 544.  
 —, psoriasis, ring blotch, scaly bark (leprosis) and shell bark (decorticosis) of, suspected virus nature of, 505.  
 —, *Septoria citri* on, interception of, in U.S.A., from Australia, Egypt, France, Greece, Italy, and Spain, 816.  
 —, *Sphaceloma fawcettii* on, see *Sporotrichum citri* on.  
 —, *Sporotrichum citri* on, in U.S.A., 578, 692.  
 —, zonate chlorosis regarded as identical with ring blotch, 505.  
 —, *aurantiifolia*, see Lime.  
 —, *aurantium* and *C. bigaradia*, see Orange.  
 —, *decumana* and *C. grandis*, see Grape-fruit.  
 —, *limonia*, see Lemon.  
 —, *maxima*, see Grapefruit.  
 —, *medica*, see Citron.  
 —, *nobilis*, see Orange.  
 —, *sinensis* and *C. unshiu*, see Orange.  
*Cladosporium* in the Arctic atmosphere, 461.  
 — in butter in Canada, 633.  
 — in eggs in France, 237.  
 — in soil in Manitoba, 791.  
 — on avocado pear in U.S.A., 707.  
 [ *Cladosporium*] on fruit in storage in U.S.A., 322.  
 — on fruit trees in Canada, 44.  
 — on orange in the Argentine, 15.  
 — on tobacco in Madagascar, 335.  
 — on vegetables in storage in U.S.A., 322.  
 — on wheat in Algeria, 91.  
 — stage of *Ceratostomella piceae*, 804; of *Ophiostoma* spp., 274.  
 — album renamed *Hyalodendron album*, 70.  
 — *carpophilum* on peach in Canada, 44; in U.S.A., 683.  
 — *condylonema* on plum in Belgium, 679.  
 — *cucumerinum* on cucumber in Trinidad, 182; in U.S.A., 811.  
 — *elatum* on wood pulp in Sweden, 275; *Hormodendrum elatum* synonym of, 275.  
 — *fulvum* on tomato, breeding against, 78, 202, 684; control, 9, 78, 610, 662; occurrence in England, 9, 662; in Germany, 78; in U.S.A., 202, 684; in Victoria, 610; physiology of, 475; studies on, 202, 475; *Trichothecium roseum* mistaken for, 475; varietal resistance to, 78, 202.  
 —, —, resistance of *Lycopersicum pimpinellifolium* to, 202.  
 — herbarium as a constituent of sooty moulds in New S. Wales, 59, 60.  
 — — can infect beet, 281.  
 — —, cellulose decomposition by, 332.  
 — — in butter, 761.  
 — — in pharmaceutical preparations in Denmark, 115.  
 — — in soil in Japan, 332.  
 — — on grapes in France, 492.  
 — — on mango from India, 518.  
 — — on pine and spruce in U.S.S.R., 68.  
 — — on timber in Sweden, 275; in U.S.S.R., 270.  
 — —, stimulatory effect of, on *Ophiobolus graminis*, 689; (?) on *Phoma betae*, 281.  
 — —, toxicity of chemicals to, 115.  
 — — var. *cellulosae* on paper in France, 584, 697.  
 — *nodulosum* on apple in Italy, 373.  
 — *pisicolum* can infect broad bean, 71.  
 — — on peas in U.S.A., 71.  
 — *tropicalis* on man in French Equatorial Africa, 695.  
*Clarkia*, *Phytophthora parasitica* on, in Rhodesia, 678.  
*Clasterosporium* on apple in U.S.A., now referred to *Helminthosporium papulorum*, 372.  
 — *carpophilum* in the air of orchards in Bulgaria, 50.  
 — — on almond in U.S.A., 179.  
 — — on peach in France, 594.  
 — — on stone fruits in Western Australia, 315.  
 — *mullerii* on sunflower in Brazil, 87.  
*Claviceps purpurea*, alkaloids of, 93, 362, 511, 696, 697.  
 — — on rye, losses caused by, 215; occurrence in Hungary, 93; in Rumania, 215; in Spain and U.S.S.R., 93.  
*Clematis virginiana*, *Puccinia rubigo-vera* can infect, 746.

*Clitocybe* on banana in New S. Wales, 348.  
 — *dealbata* on mushrooms, 739.  
 — *tabescens*, comparison of, with *Armillaria mellea*, 86.  
 — —, host range of, 86, 564.  
 — —, on vine in U.S.A., 86.  
*Clover* (*Trifolium*), *Bacterium trifoliorum* on, 16.  
 —, 'black-patch' of, in U.S.A., 85.  
 —, *Colletotrichum cereale* [*C. graminicola*] and *C. destructivum* on, in U.S.A., 85.  
 —, *Corticium solani* on, resistance to, 603.  
 —, *Dothidella trifolii* on, in Estonia, 241; in U.S.A., 367; synonymy of, 367.  
 —, *Erysiphe communis* on, in U.S.S.R., 52.  
 —, — *polygoni* on, factors affecting, 572; occurrence in Estonia, 241; in Germany, 572; (?) in U.S.A., 287; physiological effects of, 174; varietal resistance to, 288.  
 —, *Kabatiella carlívora* on, in Estonia, 241; in U.S.A., 85.  
 —, magnesium deficiency of, in U.S.A., 645.  
 —, pea mosaic can infect, 486.  
 —, *Peronospora trifolii* *hybriди* and *P. trifoliorum* on, in Estonia, 241.  
 —, *Pseudopeziza trifolii* on, in Estonia, 241.  
 —, *Pythium* on, in U.S.A., 588.  
 —, reclamation disease of, in Germany, 255.  
 —, (?) *Sclerotinia sclerotiorum* on, in U.S.A., 685.  
 —, — *trifoliorum* on, control, 39; effect of, on yield, 39; host range of, 315; occurrence in England, 677; in Estonia, 241; in Germany, 39; in Sweden, 315; specific resistance to, 677.  
 —, *Thysanopora sarcinaeforme* on, in Spain, 396.  
 —, *Uromyces fallens* on, physiological effects of, 174.  
 —, — *flectens* on, in U.S.A., 794.  
 —, — *minor* on, in Estonia, 241.  
 —, — *trifolii* in Tasmania, 425; in U.S.A., 794.  
 —, — *trifolii-repentis* on, in Estonia, 241.  
 —, white spotting of, in Germany, 572.  
 Club leaf of cotton in the Philippines, 755.  
 Coal tar as a wound dressing, 567.  
 —, see also Creosote.  
*Coccidioides immitis* can infect tomato, 405.  
 —, — on man, as a type of mycosis, 631; biology of, 362; conjugation and endosporulation of, 361; occurrence in Brazil, 759; in U.S.A., 169; *Scopulariopsis americana* synonym of, 100; studies on, 100, 169, 361, 362, 444, 445; systematic position of, 234.  
 —, — var. *meteuropeaea* on man in Italy, 101, 445; *Glenospora meteuropeaea* renamed, 101.  
 Coccoids, see Scale insects.  
*Cocomyces hiemalis* on cherry, control, 150, 381, 497, 706; factors affecting, 376; occurrence in U.S.A., 150, 178, 376, 381, 455, 497, 706; variation in, 376, 455.  
*Cochliobolus*, segregation of, from *Ophiobolus*, 125.  
 — *heterostrophus* on maize, 125; *Ophiobolus heterostrophus* renamed, 125.  
*Cochlonema dolichosporum* and *C. verrucosum* on *Amoeba* sp. and *A. sphaerocystis* in U.S.A., 360.  
*Coco-nut* (*Cocos nucifera*), bronze leaf wilt of, in Trinidad, 579.  
 —, *Ceratostomella paradoxa* on, in Ceylon, 145.  
 —, *Ganoderma lucidum* on, in India, 693.  
 —, gummosis (?) physiological in Java, 152.  
*Cocos plumosa*, *Botryosphaeria ribis chromogena* on, in U.S.A., 196.  
*Coffee* (*Coffea*), 'bark-splitting' disease of, in Dutch E. Indies, 743.  
 —, bacterial leaf nodules ('domatia') of, 154.  
 — black bean in India, 164.  
 —, *Botryodiplodia theobromae* and *Cephaluros* (?) *parasiticus* on, in the Cameroons, 31.  
 —, *Cercospora coffeicola* on, in the Cameroons, 31; in Venezuela, 397.  
 —, chlorosis in E. Africa, 755.  
 —, *Colletotrichum* (?) *coffeae* on, in the Cameroons, 32.  
 —, *Corticium koleroga* on, control, 164; occurrence in India, 164, 795; in the Ivory Coast, 154; in Venezuela, 397.  
 —, — *salmonicolor* on, in the Cameroons, 31.  
 —, — *sasakii* and *C. stevensii* can infect, 796; comparison of, with *C. koleroga*, 795.  
 —, die-back of, in India, 164.  
 —, diseases, legislation against, in Brazil, 544.  
 —, 'Elgon die-back' of, in Kenya, 426.  
 —, *Fomes lignosus* and *F. noxius* on, in the Cameroons, 31.  
 —, (?) *Fusarium lateritium* var. *longum* on, in Nyasaland, 561.  
 —, *Gibberella* on, in the Cameroons, 32.  
 —, *Hemileia coffeicola* on, in the Cameroons, 31, 303.  
 —, — *vastatrix* on, control, 164, 685; *H. coffeicola* attributed to, in the Cameroons, 31, 303; occurrence in India, 164; in Madagascar, 685.  
 —, *Irenina coffeeae* on, in the French Cameroons, 397.  
 —, — *insertiae* on, in the Ivory Coast, 397.  
 —, *Marasmius scandens* on, in the Ivory Coast, 153.  
 —, *Morphea citri* on, in the Cameroons, 31.  
 —, *Mycosphaerella coffeicola* on, in the Cameroons, 31.  
 —, *Nectria coffeigena* on, in the Cameroons, 31; *Fusarium coffeicola* conidial stage of, 31.  
 —, *Omphalia flava* on, in Venezuela, 397; study on, 184.  
 —, *Pestalozzia* on, in the Cameroons, 32.  
 —, phloem necrosis of, in Venezuela, 397.

[Coffee], *Phytonomas leptovasorum* on, in British Guiana, 218.

—, *Polyporus coffeeae* on, in the Cameroons, 31, 357; similarity of, to *Bornetina corium* on vine, 357.

—, *Rhizoctonia* on, control, 152; occurrence in the Cameroons, 31; in Java and Sumatra, 152, 743; varietal susceptibility to, 152.

—, *Rosellinia* on, in Venezuela, 397.

—, *Sclerotium coffeicola* on, in British Guiana, Surinam, and Trinidad, 184; *Typhula* in relation to, 185.

—, (?) *Stilbum* on, in Tanganyika, 13, 678.

—, top necrosis of, in the Cameroons, 32.

—, *Trachysphaera fructigena* on, in the Ivory Coast, 153.

—, *Uredo coffeicola* on, referred to *Hemileia coffeicola*, 303.

—, *Xylaria thwaitesii* on, in Java, 743.

*Colchicum autumnale*, *Urocystis colchici* on, in Canada, 494; in Holland, 12.

—, *bornmülleri* and *C. orientale*, *Urocystis colchici* on, in Holland, 12.

Coleoptera, intracellular micro-organisms in, 305, 306.

*Coleosporium narcissi* on narcissus in England, 366.

—, *solidaginis* on China aster in U.S.A., 364.

—, *tussilaginis*, receptive hyphae of, 464.

*Colias lesbia*, *Sporotrichum globuliferum* and *S. paraense* can infect, 98.

(?) *Colletotrichum* on *Phaseolus lunatus* in U.S.A., 4.

— on *Piper betle* in India, 718.

— on raspberry in U.S.A., 378.

— on tea in India, conidial stage of *Glomerella major*, 720.

—, *atramentarium* on potato in New Zealand, 466.

—, *capsici* on chilli in the Argentine, 15; in U.S.A., 344.

—, *caulicola* synonym of *C. truncatum*, 416.

—, *cereale*, see *C. graminicola*.

—, *circinans* on *Allium schoenoprasum* in England, 423.

—, — on onion, toxicity of phenolic compounds to, 553.

—, (?) *coffeanum* on coffee in the Cameroons, 32.

—, *destructivum* on clover and lucerne in U.S.A., 85.

—, *falcatum* on sugar-cane in Japan, 657; in U.S.A., 257, 469, 564, 656, 718; study on, 656; varietal resistance to, 257, 469, 564, 656, 718.

—, *fragariae* on strawberry in U.S.A., 563.

—, *gloeosporioides* on avocado pear in U.S.A., 707.

—, — on citrus, control, 628; factors affecting, 755; occurrence in Sierra Leone, 428; in S. Africa, 755; in U.S.A., 628.

—, — on grapefruit in Trinidad, 183, 754.

—, — on kumquat in the Argentine, 15.

—, — on lemon in the Argentine, 15.

—, — on orange, control, 315; method of infection by, 692; occurrence in the Argentine, 15; in U.S.A., 578; in Western Australia, 315.

[*Colletotrichum*] *graminicola* on clover in U.S.A., 85.

—, — on oats in Canada, 494, 574; *C. cereale* synonym of, 575.

—, — on sorghum in Burma, 286.

—, — on wheat in Canada, 494.

—, *higginsiunum* on turnip in U.S.A., 486.

—, *hsienjenchang* on bamboo in Japan, 498.

—, *lagenarium* on cucumber in Trinidad, 182.

—, — on vegetable marrow in U.S.S.R., 344.

—, — on watermelon in S. Africa, 426.

—, *lindemuthianum* on bean in Brazil, 734; in Germany, 670.

—, *lini* on flax in Germany, 763.

—, *luxificum* on cacao, 566.

—, *phaseolorum* can infect bean, 342.

—, — on cowpea and *Phaseolus radiatus* var. *area* in Japan, 342.

—, *truncatum* on bean and *Phaseolus lunatus* in U.S.A., 416; synonymy of, 416.

Colloidal copper, use of, against *Cercospora nicotianae* on tobacco, 425; against *Peronospora tabacina* on tobacco, 216; use of urea as a stabilizer for, 245.

—, —, see also Bouisol.

—, sulphur, use of, against *Bacterium pruni* on peach, 682; against *Diplodia natalensis* on orange, 86; against mildew in Germany, 380; against *Venturia inaequalis* on apple, 148; use of urea as a stabilizer for, 245.

Collophony, see Resin.

*Colocasia antiquorum*, *Corticium solani* on, in the Gold Coast, 14.

—, *Phytophthora colocasiae* on, in India, 122.

—, *Phytophthora palmivora* can infect, 123.

*Commelina communis*, celery virus 1 on, in Cuba, 93; in U.S.A., 615.

—, *nudiflora*, celery virus 1 can infect, 5; occurrence in, in Cuba, 93; in U.S.A., 93, 112, 553, 615; transmission of, by *Aphis gossypii*, 93, 112; by *A. maidis*, 112.

—, —, mosaic of, in Hawaii, 378; transmission of, to pineapple, 379.

*Comptonia*, *Gymnosporangium globosum* on, immunity from, 368.

Concentric necrosis of potato, comparison of, with 'medullary necrosis', 253; synonyms of, 253.

—, ring blotch of citrus in Tanganyika, 679.

Conifers, *Alternaria* on, in Canada, 409.

—, *Fusarium ferruginosum* [*F. scirpi* var. *acuminatum*], *F. redolens*, *F. solani*, *F. subpallidum* [*F. sambucinum* f. 5], and *Rhizoctonia* on, in Canada, 409.

*Coniophora cerebella*, see *C. puteana*.

(?) *fusispora* on pine and spruce in Sweden, 803.

—, *puteana* on timber, action of, 69; control, 268, 541; factors affecting, 267; occurrence in England, 136; in Ger-

many, 69; in U.S.A., 541; in U.S.S.R., 270; specific resistance to, 268; studies on, 267, 268.

[*Coniophora puteana*], use of, in tests of timber preservatives, 276, 412.

*Conioспорium arundinis* on potato in New Zealand, 466.

*Coniothecium chomatosporum* on apple in England, 617.

*Coniothyrium* on apple and cherry in Canada, 44, 177.

— on elm in U.S.A., 203, 537.

— on peach in Canada, 44, 177.

— on pear in Holland, 12; in Canada, 44, 177.

— on plum in Canada, 44, 177.

— on *Prunus pennsylvanica* in Canada, 44.

— on rose in the Argentine, 15.

— *bataticola* on sweet potato in U.S.S.R., 651.

— *rosarum* on rose in England, 313, 638.

*Convolvulus arvensis*, tomato woodiness affecting, in U.S.S.R., 131, 724.

—, tomato spotted wilt affecting, in England, 107.

Copepods, *Lagenidium giganteum* on, in U.S.A., 758.

Coposil, composition of, 591.

—, use of, against *Mycosphaerella pomi* on apple, 151; against *Venturia inaequalis* on apple, 150, 591, 683; as a fungicide, 382.

Copper, effect of fungicides on, and vice versa, 597.

— acetate, use of, against *Ceratostomella paradoxa* on date palm, 561.

— carbonate, use of, against *Bacterium malvacearum* on cotton, 33; against *Fusarium culmorum* and *Helminthosporium sativum* on barley, oats, and wheat, 688; against *Urocystis tritici* on wheat, 25; against wheat bunt, 22, 90, 287, 572.

— dust AB, use of, against wheat bunt, 22.

— chloride, toxicity of, to *Pseudomonas mors-prunorum*, 641.

—, basic, use of, against *Ustilago avenae* and *U. kolleri* on oats, 745; against wheat bunt, 745.

—, colloidal, see Colloidal copper.

— compound and arsenic, use of, as timber preservative, 337.

— cyanamide, use of, against *Sporotrichum citri* on citrus, 692.

— deficiency in relation to plant diseases, 469; to reclamation disease of beets, 209; of oats and other cereals and fodder plants, 256.

— dust, Wacker, use of, against *Plasmopara viticola* on vine, 79.

— emulsion, use of, against *Cercospora nicotianae* on tobacco, 425; against *Peronospora tabacina* on tobacco, 216; against *Phragmidium* A and B and *Sphaerotheca pannosa* on rose, 638.

— fungicides, action of, 75, 244, 422.

— lime dust, use of, in S. Africa, 213; in U.S.A., 222, 223, 253, 488, 607.

[Copper lime]-arsenite mixtures, fungicidal efficacy of, 381.

— oleate, use of, against *Sphaerotheca pannosa* on rose, 638, 644.

— oxide, red (cuprous), use of, against *Corticium solani* on various hosts, 151; against damping-off of spinach, 673; against mildew on paint coatings, 520; against *Peronospora* on tobacco, 403; against *Phytophthora infestans* on tomato, 218; against (?) *Pythium* on cucumber and spinach, 563; on various hosts, 151; against *P. ultimum* on various hosts, 383; against *Rhizoctonia* on cucumber and spinach, 563; against *Venturia inaequalis* on apple, 218; as a fungicide, 382.

— oxychloride, use of, against *Clasterosporium carpophilum* on peach, 594; against *Plasmopara viticola* on vine, 454; against *Sclerotinia laxa* on peach, 594; against wheat bunt, 562; as a fungicide, 382.

—, see also Verderame sulphur dust.

— phosphate, use of, against *Bacillus amylovorus* on apple and pear, 221; against fruit diseases, 381; against *Venturia inaequalis* on apple, 591; as a fungicide, 382.

— salicylate, use of, against wheat bunt, 90, 228.

— soap emulsion, preparation of, 183.

— sulphate, basic, use of, against *Sporotrichum citri* on citrus, 692; against wheat bunt, 287.

—, consumption of, in France, 779; in Germany, 380; in U.S.A., 707.

—, impregnated wraps, use of, against *Botrytis cinerea* on grapes, 214.

— in vineyard soils, 244.

—, monohydrated, use of, against *Ustilago avenae* and *U. kolleri* on oats, 745; against wheat bunt, 745.

— soil treatment against *Actinomyces scabies* on potato, 118; against *Aphanomyces levis* on beet, 209; against fig leaf mottle, 706; against peach chlorosis, 319; against *Pythium de Baryanum* on beet, 209; against reclamation disease of cereal and other crops, 255, 575.

—, toxicity of, to *Botrytis allii*, 49.

— and caustic soda, use of, against *Phytophthora infestans* on potato, 527.

— and sodium bicarbonate, use of, against *Plasmopara viticola* on vine, 674.

— sulphide, fungicidal properties of, 739.

—, use of, against *Plasmopara viticola* on vine, 674, 740.

— sulphur dust (Capex), use of, against *Botrytis cinerea* on vine, 213, 491.

—, see also Cupric.

Copra, see Coco-nut.

*Coprinus atramentarius* in mushroom beds in Great Britain, 345.

*Cordyceps*, notes on species of, 443.

*Coreopsis drummondii*, tomato spotted wilt affecting, in Western Australia, 129.

*Corethropsis hominis* var. *sphaeroconidica* on man in Italy, 105.

Cork of apple in Tasmania, 242; in U.S.A., 592.  
 'Corky-pit' of apple, see Internal cork of *Coronus mas*, *Lambertella corni-maris* on, in Germany, 451; (?) identical with *Phaeosclerotinia nipponica*, 451.  
 —, mosaic of, in Bulgaria, 462.  
 Corona PD 7, use of, against *Fusarium bulbigenum* var. *batatas* and *F. oxysporum* f. 2 on sweet potato, 150.  
*Corticium* on groundnut, 212.  
 — on *Pteridium aquilinum* in Scotland, 797.  
 — *anceps* can infect *Aspidium aculeatum* var. *lobatum*, *A. spinulosum*, *Asplenium trichomanes*, *Blechnum spicant*, *Cystopteris fragilis*, *Polypodium vulgare*, and *Scolopendrium vulgare*, 797.  
 — on *Aspidium filix-mas*, 797.  
 — on *Pteridium aquilinum* in Germany, 797; in Northern Ireland, 796, 797; in Scotland, 797.  
 — *centrifugum* on apple in Northern Ireland, 701.  
 — on *Iris*, *Lagenaria vulgaris* var. *depressa*, *Pentstemon*, *Phlox*, and rhubarb in Japan, 719.  
 — on rice, immunization against, 385.  
 — on *Yucca* in Japan, 719.  
 — *fuciforme* on *Agropyron repens*, *Agrostis tenuis*, *Bromus mollis*, *Festuca*, *Holcus mollis*, *Lolium perenne*, and *Poa annua* in Great Britain, 587.  
 — on turf, control, 562, 587, 588; occurrence in Great Britain, 588; in U.S.A., 562.  
 —, relation of, to *Geotrichum roseum*, 588.  
 — *koleroga* can infect coffee, *Gardenia angusta* var. *ovalifolia*, *Pyrus serotina*, 796.  
 —, comparison of, with *C. sasakii* and *C. stevensii*, 795.  
 — on cacao in the British Empire, 87.  
 — on coffee, control, 164; occurrence in India, 164, 795; in the Ivory Coast, 154; in Venezuela, 397.  
 — *leve* on spruce in U.S.S.R., 68.  
 — on timber in U.S.S.R., 270.  
 — *rolfsii* on cotton, *Piper betle*, and potato in India, 125.  
 — on rice, immunization against, 385.  
 — on sugar-cane in India, 125.  
 —, perfect stage of *Sclerotium rolfsii*, 125, 196.  
 — *salmonicolor* on apple in Ceylon, 146.  
 — on cacao, control, 566; occurrence in the British Empire, 87.  
 — on citrus in Ceylon, 146.  
 — on coffee in the Cameroons, 31.  
 — on grapefruit in Trinidad, 627.  
 — on *Hevea* rubber in Borneo, 152; in Malaya, 791.  
 — on pepper in Borneo, 152.  
 — *sasakii* can infect coffee, *Gardenia angusta* var. *ovalifolia*, and *Pyrus serotina*, 796.  
 — on rice, comparison of, with *C. stevensii* and *C. koleroga*, 795; occurrence in Japan, 120, 795.

[*Corticium solani*, antagonism of *Acrostalagmus*, *Aspergillus niger*, *Botrytis cinerea*, *Fusarium lateritium*, *Penicillium*, and *Verticillium* to, 188; of *Trichoderma lignorum* to, 188, 248, 463.  
 — can infect bean, buckwheat, carrot, 603; cowpea, 671; lucerne, 208; pea, *Phleum pratense*, turnip, and vetch, 603.  
 —, heat stable toxin of, 603.  
 — in soil in U.S.A., 520.  
 — on bean in Brazil, 734; in U.S.A., 671.  
 — on beet, control, 671, 809; occurrence in the Argentine, 15; in Irish Free State, 809; in N. America, 207; in U.S.A., 671; study on, 207.  
 (?) — — on cabbage in U.S.A., 151.  
 — — on chilli in U.S.A., (?) 151, 344.  
 — — on citrus in U.S.A., 188.  
 — — on clover, resistance to, 603.  
 — — on *Colocasia antiquorum* in the Gold Coast, 14.  
 — — on cotton in the Belgian Congo, 223; in U.S.A., 629.  
 — — on *Crotalaria juncea* in India, 144.  
 (?) — — on cucumber and eggplant in U.S.A., 151.  
 — — on lettuce in U.S.A., 73.  
 — — on lucerne and *Lolium perenne*, resistance to, 603.  
 — — on oats in S. Australia, 559; resistance to, 603.  
 — — on peas in U.S.A., 151, 463.  
 (?) — — on *Phaseolus lunatus* in U.S.A., 151.  
 — — on pigeon pea in India, 144.  
 — — on *Piper betle* in India, 122, 718.  
 — — on potato, control, 55, 118, 150, 497, 527, 607; factors affecting, 118, 150, 208, 497, 527; losses caused by, 423; notes on, 423; occurrence in Canada, 607; in England, 423; in Holland, 528; in New S. Wales, 55; in New Zealand, 466; in N. America, 207; in Poland, 527; in U.S.A., 118, 150, 497, 563; strains of, 207; study on, 207; varietal susceptibility to, 563.  
 — — on radish in Sweden, 340.  
 — — on rice in U.S.A., 221.  
 (?) — — on spinach in U.S.A., 151.  
 — — on spruce in Switzerland, 482, 728.  
 — — on *Stachys affinis* in France, 77.  
 — — on strawberry in Rhodesia, 427; (?) in U.S.A., 563.  
 — — on sunflower, resistance to, 603.  
 (?) — — on sweet peas in U.S.A., 151.  
 — — on tomato in U.S.A., (?) 151, 263.  
 — — on turf in Holland, 240; in S. Africa, 426.  
 — — on wheat in New S. Wales, 622; in S. Australia, 559; resistance to, 603.  
 — — on *Xanthosoma sagittifolium* in the Gold Coast, 14.  
 — — on yams in Nigeria, 217.  
 — *stevensii* can infect coffee, *Gardenia angusta* var. *ovalifolia*, and *Pyrus serotina*, 796.  
 —, comparison of, with *C. koleroga* and *C. sasakii*, 795.  
 — — on grapefruit in Trinidad, 627.

[*Corticium*] *vagum* on timber in U.S.A., 258.  
 (?) *Cortinarius* on barley and wheat in England, 621.  
*Corylus avellana*, *Bacterium juglandis* on, in U.S.A., 204.  
 ——, *Labrella coryli* on, in Italy, 680.  
 ——, mosaic of, in Bulgaria, 462.  
 ——, *Naemopspora* on, in Cyprus, 742.  
 ——, *Phyllactinia corylea* on, in Italy, 680; in U.S.A., 204.  
 ——, *colurna*, *Bacterium juglandis* on, in U.S.A., 204.  
 ——, *rostrata*, *Mycelium radicis nigrostrigorum* on, in Sweden, 187.  
 ——, *Phyllactinia corylea* on, in U.S.A., 204.  
*Corynelia uberata* on *Podocarpus madagascariensis* in Madagascar, 333.  
*Coryneum delleanii* on persimmon in Italy, 113, 656.  
 ——, *microstictum* on rose in U.S.A., 172.  
 ——, *myristicae* on nutmeg in Java, 152.  
 ——, *rhododendri*, *Cryptostictis mariae* wrongly referred to, 66.  
 ——, *ruborum* on raspberry in France, 595.  
*Cosmos*, tomato spotted wilt affecting, in Western Australia, 129.  
*Cotoneaster*, *Bacillus amylovorus* can infect, 110.  
 ——, *Phymatotrichum omnivorum* on, in U.S.A., 562.  
*Cotton (Gossypium)*, *Alternaria* on, in the Philippines, 755; in U.S.A., 629.  
 ——, *Ascochyta gossypii* on, (?) in the Sudan, 756; in U.S.A., 629.  
 ——, *Aspergillus niger* on, in U.S.A., 629.  
 ——, bacterial staining of, in S. Africa, 97.  
 ——, *Bacterium malvacearum* on, breeding against, 164, 358; control, 32, 82, 221, 304, 562, 629, 757; effect of, on yield, 32; factors affecting, 82, 757; notes on, 96, 97, 757; occurrence in the Belgian Congo, 223; in the Philippines, 755; in St. Vincent, 164; in the Sudan, 96, 358, 757; in Uganda, 82, 97, 358; in U.S.A., 221, 562, 629; in U.S.S.R., 32, 304; study on, 32; varietal resistance to, 32, 82, 97, 164, 223, 304, 358.  
 ——, *Cercospora althaeina* on, in the Philippines, 755.  
 ——, *gossypina* on, in U.S.A., 629.  
 ——, *Cerotelium desmum* on, in Cuba, Porto Rico, and U.S.A., 629.  
 ——, club leaf of, in the Philippines, 755.  
 ——, *Corticium rolfsii* on, perfect stage of *Sclerotium rolfsii*, 125.  
 ——, *solani* on, in the Belgian Congo, 223; in U.S.A., 629.  
 ——, crazy top of, in U.S.A., 629.  
 ——, *Diplodia* on, in U.S.A., 564.  
 ——, *gossypina* on, in U.S.A., 629.  
 ——, *Eremothecium ashbyii* on, in the Sudan, 693.  
 ——, *Fusarium* on, in the Sudan, 756; in Uganda, 358; in U.S.A., 629; varietal susceptibility to, 358.  
 ——, *equiseti* on, in the Sudan, 756.  
 ——, *roseum* on, in U.S.A., 629.  
 ——, *scirpi* var. *caudatum* and *F. solani* on, in the Sudan, 756.  
 [Cotton, *Fusarium*] *vasinfectum* on, control, 359, 629; factors affecting, 359; nature of resistance to, 221; occurrence (?) in the Belgian Congo, 224; in India, 358, 359; (?) in Uganda, 82; in U.S.A., 221, 629; studies on, 359.  
 ——, *Gibberella moniliformis* on, in the Sudan, 756; in U.S.A., 629.  
 ——, *Glomerella gossypii* on, in the Philippines, 755; in U.S.A., 629.  
 ——, *Helminthosporium gossypii* on, in the Philippines, 755.  
 ——, internal boll disease of, in the Belgian Congo, 507.  
 ——, *Kuehneola desmum* on, see *Cerotelium desmum* on.  
 ——, leaf curl, breeding against, 165; control, 165, 757; factors affecting, 165, 579; occurrence in Fiji, 98; in Italian Somaliland, 579; in the Sudan, 165, 757; study on, 165; types of, 98, 579; varietal resistance to, 165, 358.  
 ——, lightning injury to, in U.S.A., 629.  
 ——, *Macrophomina phaseoli* on, factors affecting, 360, 561; occurrence in India, 360, 561; in Sudan, 756; in U.S.A., 670.  
 ——, *Macrosporium nigricans* on, in Brazil, 87.  
 ——, magnesium deficiency of, in U.S.A., 629.  
 ——, *Mycosphaerella areola* on, in U.S.A., 629.  
 ——, nematodes on, in India, 359.  
 ——, *Nematospora* on, *Dysdercus delauvreyi* in relation to, 164; occurrence in St. Vincent, 164.  
 ——, *coryli* and *N. gossypii* on, factors affecting, 358; notes on, 223; occurrence in the Belgian Congo, 223, 507; in Rhodesia, 358; in S. Africa, 97, 357; transmission of, by *Dysdercus* spp., 97, 357.  
 ——, Phycomycetoid endophyte in, in the Sudan, 756.  
 ——, *Phymatotrichum omnivorum* on, control, 381, 442, 443, 629; effect of, on fibre and seed, 360; evaluation of losses caused by, 304; factors affecting, 442, 443; occurrence in U.S.A., 165, 166, 304, 360, 442, 443, 629; persistent strands of, 165, 166; studies on, 166, 442, 443.  
 ——, potash hunger of, in U.S.A., 629.  
 ——, *Puccinia hibisciata* on, see *P. schedonnardi* on.  
 ——, *schedonnardi* on, in U.S.A., 348, 629.  
 ——, *Pythium* on, in the Sudan, 756.  
 ——, red rot of bolls of, in the Belgian Congo, 223.  
 ——, *Rhizopus nigricans* on, in U.S.A., 629.  
 ——, 'rust' in U.S.A., 629.  
 ——, *Sclerotium rolfsii* on, in the Belgian Congo, 223; in India, 125; perfect stage of, 125.  
 ——, stenosis in India, 507, (?) 561.  
 ——, *Verticillium albo-atrum* on, control, 629; occurrence (?) in the Belgian Congo, 224; in Brazil, 87, 629; in U.S.A., 629.  
 ——, Waxahachie wilt of, in U.S.A., 562.  
 ——, wilt in the Sudan, 358, 756.

[Cotton], raw and textile, *Aspergillus candidus*, *A. glaucus*, *A. herbariorum* var. *majus*, *A. niger*, *A. versicolor*, and *Penicillium* on, 585.

Cotton-seed oil Bordeaux, use of, against *Botrytis cinerea* on vine, 11; against *Venturia inaequalis* on apple, 769.

— residue, industrial fermentation of, by fungi, 604.

Cottonwood (*Populus*), (?) bacterial disease of, in U.S.A., 409.

Court-noué of vine, attributed to *Pumilus medullae*, 8, 675; to a virus, 8; control, 272, 347; cytological study on, 616; mycorrhizal endophyte in relation to, 8; occurrence in Australia, 8; in France, 272, 346, 675; in Germany, 79; in Italy, 616; varietal resistance to, 347.

Cowpea (*Vigna unguiculata*), celery virus can infect, 5.

—, *Cercospora cruenta* on, conidial production by, 195; *Mycosphaerella cruenta* perfect stage of, 281; occurrence in Brazil, 87; in U.S.A., 195, 280.

—, *Colletotrichum phaeolorum* on, in Japan, 342.

—, *Corticium solani* can infect, 671.

—, cucumber virus 1 (Porter) can infect, 5.

—, — 1 (Johnson) can infect, 6.

—, *Fusarium [bulbigenum var.] tracheiphilum* on, in U.S.A., 208.

—, *Heterodera marioni* on, in Egypt, 614; in U.S.A., 208.

—, *Macrophomina phaseoli* on, breeding against, 208; occurrence in Cyprus, 742; in U.S.A., 208, 670; pathogenicity of, to bean, 670; varietal susceptibility to, 42.

— mosaic in British Guiana, 218.

—, nematodes on, in Cyprus, 742. (See also *Heterodera marioni* on.)

—, *Nematospora coryli* and *N. gossypii* on, in the Belgian Congo, 507.

—, *Primula* virus can infect, 635.

—, tobacco virus 10 can infect, 798.

—, *Uromyces vignae* on, in Cyprus, 742; in Egypt, 614.

Cracking, non-parasitic, of vine branches in Italy, 11.

Cranberry (*Vaccinium*), false blossom and fruit rots of, in U.S.A., 776.

*Crataegomespilus*, *Gymnosporangium globosum* on, in U.S.A., 368.

*Crataegus*, *Bacillus amylovorus* can infect, 110.

—, *Gymnosporangium globosum* on, in U.S.A., 368.

Crazy top of cotton in U.S.A., 629.

Creosote, permanency of components of, in treated timber, 70.

—, physical properties of, in relation to timber preservation, 806.

—, use of, as a timber preservative, 138, 276, 413, 545, 730.

— oil, consumption of, in U.S.A., 707.

—, use of, as a timber preservative, 139.

— petroleum, use of, as a timber preservative, 667.

[Creosote oil] phosphatide, use of, as a timber preservative, 205.

—, see also Coal tar, Tar.

Cresol, toxicity of, to *Epidermophyton*, *Monilia*, *Saccharomyces*, and *Torula*, 758.

Crinkle of apple in Tasmania, 242; in U.S.A., 592.

— of beet in Germany and Poland, 548; transmission of, by *Zosmenus quadratus*, 548.

— of potato, breeding against, 784; control, 715, 784; effect of, on host protoplasm, 465; factors affecting, 387; 'frisolee' synonymous with, 246; occurrence in Belgium, 326; in Germany, 387; in Italy, 328; in New Zealand, 715; in Scotland, 784, in U.S.A., 147, 784; relation of, to potato viruses X and Y, 186, 246; study on, 784; transmission of, to tobacco, 326; tuber indexing against, 147.

— of rose in U.S.A., 363.

(?) — of spinach, 548; transmission of, by *Zosmenus quadratus*, 584.

— of strawberry in U.S.A., 288.

— A of potato in Italy, 786.

— mosaic of potato in Australia, England, Ireland, and Japan, 524; transmission of, to *Datura*, tobacco, and other Solanaceae, 681.

Crinkly leaf of citrus, suggested virus nature of, 505.

*Crinum powelli*, *Stagonospora curtisii* can infect, 448.

*Crocus*, disease of corms of, in Holland, 12. — *sativus*, see Saffron.

(?) *Cronartium asclepiadeum* on pine in Switzerland, 339.

— *cerebrum* and *C. coleosporioides*, *Tuberculina maxima* on, in U.S.A., 482.

— *occidentale* on red currant, varietal immunity from, 377.

— *pyriforme*, *Tuberculina maxima* on, in U.S.A., 482.

— *quericum* on oak in Italy, 680; in Japan, 533.

— *ribicola* on currants, control, 540; legislation against, in U.S.A., 544; occurrence in England, 617; in Germany, 666; varietal immunity from, 377.

— — on gooseberry, control, 455, 540; legislation against, in U.S.A., 544.

— — on pine, control, 64, 455, 540, 541, 666, 727; occurrence in Canada, 66, 135, 377; in Germany, 541, 666; in U.S.A., 64, 220, 348, 377, 410, 540, 727.

— — on *Ribes*, eradication against, 220, 455, 540, 666; occurrence in Canada, 66, 135; in Germany, 666; in U.S.A., 410; role of, in spread of infection to pine, 66, 135; specific and varietal resistance to, 666; study on, 66.

— —, *Tuberculina maxima* on, in U.S.A., 482, 727.

*Crotalaria juncea*, *Corticium solani* on, in India, 144.

— —, *Fusarium vasinfectum* on, in India, 144; varietal resistance to, 560.

[*Crotalaria juncea*], *Neocosmospora vasinfecta* on, in India, 144.

Crown disease of oil palm in Malaya, 357.

— rot of beet, see Dry and heart rot of.

Cruciferae, *Cystopus candidus* on, in Japan, 1.

—, mosaic of, in U.S.A., 731; transmission of, by *Myzus persicae*, 473. (See also under Turnip mosaic.)

—, *Plasmodiophora brassicae* on, control, 414, 485; English translation of Woronin's paper on, 485; host range of, 414; occurrence in France, 485; in U.S.A., 206.

*Cryptocarya peumus*, *Pestalozzia gracilis* on, in Italy, 608.

*Cryptococcus* in Italian and other leavens, 383.

— breweri, *Torulopsis neoformans* may be synonym of, 758.

— *dermatitidis* synonym of *Gilchristia dermatitidis*, 100.

— *farcinimodus* on man, notes on, 100, 631.

—, renamed *Histoplasma farcinimodus*, 235, 446; not accepted, 583.

(?) — *gilchristi* synonym of *Gilchristia dermatitidis*, 100.

— *guilliermondi* may be synonym of *Torulopsis neoformans*, 758.

— *hominis* on man, 100; distinction of, from Mycotoruleae, 582; *Torula histolytica* (?) synonym of, 100.

— *kleini* may be synonym of *Torulopsis neoformans*, 758.

— *montpellieri* renamed *Candida montpellieri*, 168.

— *muris* on man, 631.

—, renamed *Histoplasma muris*, 235, 446; not accepted, 583.

— *plimmeri* may be synonym of *Torulopsis neoformans*, 758.

*Cryptodiaporthe macounii* var. *rubi* on raspberry in France, 595.

Cryptonol, use of, against *Phoma betae* on beet in France, 552.

*Cryptosporium minimum* on rose in Germany, 172; in U.S.A., 171.

*Cryptostictia arbuti* on *Arctostaphylos columbiana*, *Arbutus menziesii*, and *Ledum glandulosum* in U.S.A., 66; *Disaeta arbuti* synonym of, 66.

— *mariae* on *Rhododendron californicum* in U.S.A., 66.

— wrongly referred to *Coryneum rhododendri*, 66.

Cucumber (*Cucumis sativus*), *Alternaria cucumerina* on, in Trinidad, 182.

—, *Asterocystis radicis* on, in Germany, 212.

—, *aucuba* mosaic of, see Cucumber virus 4.

—, *Bacterium formosanum* can infect, 738.

—, — *lacrymans* on, comparative studies on, 16.

—, celery virus 1 can infect, 5, 112; occurrence in Cuba, 93; in U.S.A., 615.

—, *Cladosporium cucumerinum* on, in Trinidad, 182; in U.S.A., 811.

[Cucumber], *Colletotrichum lagenarium* on, in Trinidad, 182.

—, (?) *Corticium solani* on, in U.S.A., 151.

—, curly top of, in U.S.A., 339.

—, damping-off of, in U.S.A., 671.

—, *Fusarium* on, in Trinidad, 182.

—, — *moniliforme* var. *anthophilum* on, in Trinidad, 182.

— mosaic, absorption and elution of virus of, 143; control, 811; occurrence in England, 811; in India, 143; in U.S.A., 245, 534; properties of virus of, 143, 554, 659; relation of, to potato vein-banding virus and Valleau's tobacco virus 10729, 782; serological studies on, 245, 385; studies on, 143, 245; transmission of, to cowpea, 635; to eggplant, 534; to *Nicotiana glutinosa*, 635; to *Phytolacca decandra*, 534; to *Primula sinensis*, 635; to *Solanum nigrum* and spinach, 534; to tobacco, 401, 473, 534, 635, 660; to tomato, 534; to *Zinnia elegans*, 473, 812; types of, 5, 245, 534, 554; virus of, affecting *Cynoglossum amabile*, *Lycopersicum pimpinellifolium*, *Nicandra physaloides*, *Phacelia whitavia*, *Physalis heterophylla*, and *P. longifolia* in U.S.A., 473; (?) *Primula obconica* in England, 635; *Solanum nigrum* var. *guineense* in U.S.A., 473; tobacco in U.S.A., 685; tomato and *Zinnia elegans* in U.S.A., 473.

—, —, see also viruses 1 and 3 on.

—, *Mycosphaerella citrullina* on, in Trinidad, 182.

—, *Olpidium majus* on, in Wales, 489.

—, *Pseudoperonospora cubensis* on, in S. Africa, 426; in U.S.A., 683.

—, Pythiaceous fungus on, in Denmark, 559.

—, *Pythium* on, antagonism of *Trichoderma* to, 53, 187; occurrence in U.S.A., 53, (?) 151, (?) 563.

—, — *aphanidermatum* can infect, 7; host range of, 7; occurrence in China, 6.

—, *Rhizoctonia* on, antagonism of *Trichoderma* to, 53; occurrence in U.S.A., 53, 563.

— virus 1 can infect cowpea and tobacco, 6.

—, —, differentiation of Porter's virus 1 from, 5.

—, — on cucumber in England, 554, 811.

—, — (Porter's) can infect cowpea, 6; *Nicotiana glutinosa*, *N. langsdorffii*, spinach, and tomato, 5.

—, — (—) on tobacco in U.S.A., 5.

—, — 3 on cucumber in England, 554, 811; properties of, 554.

—, — 4 can infect melon and watermelon, 554.

—, — on cucumber in England, 554, 811.

*Cucumis anguria*, celery virus 1 on, in U.S.A., 615.

— *melo*, see Cantaloupe, Melon.

— *sativus*, see Cucumber.

*Cucurbita*, see Squash.

— *moschata*, *Pythium aphanidermatum* can infect, 7.

[*Cucurbita*] *pepo*, see Vegetable marrow.

Cucurbitaceae, *Erysiphe cichoracearum* on, in France, 77.

Cucurbits, celery virus 1 on, in U.S.A., 4.

Cultural methods in relation to physiology of fungi, 327.

Cumin (*Cuminum cyminum*), *Alternaria* on, in India, 560.

*Cunninghamella* in soil, distribution in Europe, 655; effect of zein on development of, 392.

— *elegans* on hay in U.S.A., 249.

Cuprammoniacal sprays, use of, against *Plasmopara viticola* on vine, 75, 76.

*Cupressus lawsoniana*, (?) *Diplodia pinea* on, in New Zealand, 65.

Cuprite sulphur, use of, against *Botrytis cinerea* on vine, 213; against *Uncinula necator* on vine, 75.

Cuprite, use of, against *Botrytis cinerea* on vine, 213.

Cupromaag, use of, against *Venturia inaequalis* on apple, 701.

Cuprosa, use of, against *Plasmopara viticola* on vine, 79.

Cuprous oxide, see Copper oxide, red.

Cupryl, use of, against *Phytophthora palmivora* on cacao, 217.

Cupulvit, use of, against *Bacterium tabacum* on tobacco, 659.

*Curcuma longa*, see Turmeric.

Curly dwarf of potato in U.S.A., 784.

— top of bean in U.S.A., 339.

— of beet, effect of, on yield, 488; histological studies on, 487, 813; host range of, 171, 339; isolation of virus of, 550; legislation (proposed) against, in U.S.A., 488; nature of resistance to, 551; occurrence in U.S.A., 171, 339, 487, 488, 809, 813; overwintering of, 171; phloem degeneration in, 487; properties of virus of, 550; studies on, 171, 487, 813; transmission of, by *Eutettix tenella*, 171, 339, 550; varietal resistance to, 488, 809.

— of cantaloupe, chilli, cucumber, mangold, pansy, and squash in U.S.A., 339, 340.

— of tomato, 202; in U.S.A., 339.

Currants (*Ribes* spp.), bacteria on stored, in U.S.A., 322.

—, *Byssochlamys fulva* on, in England, 775.

—, *Cronartium occidentale* on, varietal immunity from, 377.

—, *ribicola* on, legislation against, in U.S.A., 544; occurrence in England, 617; in Germany, 666; varietal resistance to, 666.

—, eradication of, see *Ribes* eradication.

—, *Gloeosporium ribis* on, in France, 377.

—, *Macrophomina phaseoli* on, in Cyprus, 83.

—, moulds on stored, in U.S.A., 322.

—, *Phomopsis* on, in France, 377.

—, *Pseudopeziza ribis* on, pathogenicity and physiology of, 377.

—, yeasts on stored, in U.S.A., 322.

*Curvularia inaequalis*, antagonism of bacteria and moulds to, 387.

[*Curvularia*] *ramosa*, *Helminthosporium M.* identified as, 622.

— *spicifera*, *Helminthosporium tetramera* identified as, 622.

*Cusisa*, use of, against *Bacterium tabacum* on tobacco, 659.

Cyanamide, use of, against *Sclerotium (?) rolfsii* on beet, 488.

*Cyanochaeta* and *Cyanophomella* pycnidial stages of *Gibberella*, 194.

*Cyclamen persicum*, *Fusarium oxysporum* var. *aurantiacum*, *F. solani*, *Glomerella cingulata*, *Nectria rubi*, *N. septomyxa*, *Glomerella cingulata*, and *Cylindrocarpon radicicola* on, in Germany, 585.

*Cycloconium oleaginum* on olive in Cyprus, 706.

*Cyclomyces*, key to species of, 795.

*Cydonia oblonga*, *Gymnosporangium globosum* on, in U.S.A., 368.

— *vulgaris*, see Quince.

*Cylindrocarpon* in soil in Canada, 791.

— *radicicola* on *Cyclamen persicum* in Germany, 585.

— on narcissus in England, 366.

— on strawberry in England, 180.

*Cylindro-Helminthosporium*, identical with *Pyrenophora*, 125.

*Cymadothea trifolii*, *Dothidella trifolii* synonym of, 367.

*Cynara scolymus*, see Artichoke.

*Cynodon dactylon*, *Bacterium rathayi* on, in Germany, 766.

—, *Balansia cynodontis* on, in S. Africa, 794.

*Cynoglossum amabile*, cucumber mosaic affecting, in U.S.A., 473.

*Cynosurus cristatus*, reclamation disease of, in Germany, 255.

*Cyphomandra betacea*, (?) *Stilbum* on, in Tanganyika, 13.

*Cystopteris fragilis*, *Corticium anceps* can infect, 797.

*Cystopus candidus* on *Brassica cernua*, *B. chinensis*, Chinese cabbage, and rape in Japan, 2.

— on crucifers in Japan, 1.

— on horse-radish in Germany, 419.

— on turnip in Japan, 2.

— var. *macrospora* on *Brassica* and *Raphanus* in Japan, 1.

— var. *microspora* on *Arabis hirsuta*, *Capsella bursa-pastoris* var. *auriculata*, *Cardamine flexuosa*, and *Draba nemorosa* var. *hebecarpa* in Japan, 2.

*Cytospora* on poplar in Belgium, 478.

— *annularis* on ash in U.S.A., 221.

— *candida* imperfect stage of *Valsa leucostoma*, 15.

— (?) *cincta* on peach in Italy, 450.

— *leucostoma*, see *Valsa leucostoma*.

— *microspora* on apple and pear in Italy, 450.

— *persicae* on peach in Italy, 450.

— *rubescens* on apricot in Italy, 450.

— *sacchari* on sugar-cane in U.S.A., 348.

*Cytosporina ludibunda* on apple, factors affecting, 40, 453.

— (?) — on elm in U.S.A., 537.

'D' virus of potato, 329, 713.  
*Dactyella tylopaga* on *Amoeba verrucosa* in U.S.A., 508.  
*Dactylis glomerata*, *Bacterium rathayi* on, in England, 492, 514; in Germany, 766.  
—, *Epichloe typhina* on, in Germany, 766.  
—, *Erysiphe graminis* on, in Germany, 572.  
—, *Puccinia lolii* can infect, 435.  
*Dactylium dendroides* on mushrooms in Canada, Great Britain, and U.S.A., 346.  
*Daedalea*, key to species of, 795.  
—, *quercina*, use of, in tests of timber preservatives, 412.  
*Daffodil*, see *Narcissus*.  
*Dahlia* mosaic in Brazil, 634.  
—, tomato spotted wilt on, in U.S.A., 201; in Western Australia, 129.  
*Dahlia variabilis*, *Cercospora grandissima* on, in Japan, 472.  
*Daldinia concentrica* on *Pyrus baccata* in U.S.S.R., 494.  
*Daucus carota*, see Carrot.  
Damping-off of chilli, cucumber, eggplant, and melon in U.S.A., 671.  
— of ornamentals in U.S.A., 684.  
— of peas in U.S.A., 671.  
— of plants, control, 519.  
— of spinach in U.S.A., 673.  
— of tomato in U.S.A., 671.  
Damson (*Prunus insititia*), apple mosaic can infect, 639.  
'Daon lidah' of tobacco in Sumatra, 473.  
*Daphne*, *Lagenidium giganteum* on, in U.S.A., 758.  
— *mezereum*, *Marssonina daphnes* on, in Great Britain, 173, 492, 585.  
*Dasyscypha calycina* on larch in England, 264.  
— *fuscosanguinea* on pine in Austria, 266.  
— *monticola* synonym of *D. pini*, 266.  
— *pini* on pine in Canada, Norway, Sweden, and U.S.A., 266; synonymy of, 266.  
Date palm (*Phoenix dactylifera*), *Ceratostomella paradoxa* on, in Tunis, 429; in U.S.A., 561.  
—, *Fusarium albedinis* on, in Algeria, 303; in French Morocco, 302.  
*Datura*, celery virus 1 can infect, 615.  
—, potato crinkle mosaic can infect, 681.  
—, tomato spotted wilt can infect, 404; occurrence in U.S.A., 201.  
—, — woodiness on, in U.S.S.R., 131.  
— *stramonium*, celery virus 1 can infect, 5.  
—, potato calico can infect, 787.  
—, — streak can infect, 251.  
—, — virus D can infect, 329.  
—, — X can infect, 262, 713.  
—, tobacco virus 10 can infect, 798.  
—, tomato streak can infect, 201.  
—, — virus 1 can infect, 261.  
Davydoff's preparation, use of, against cereal smuts, 47; against wheat bunt, 22.  
*Debaryomyces fabryi* can infect tomato, 405.  
Decorticosis of citrus, suggested virus nature of, 505.  
Degeneration of apple and pear in Italy, 317.  
— of potato, biochemistry of, 650, 785; control, 328; detection of, in tubers, 78, 388, 785; ecology of, 650; etiology of, 54, 328, 387; factors affecting, 77, 250, 328, 650; occurrence in Estonia, 785; in France, 77, 250; in Germany, 54, 78, 328, 387, 650, 785; in Italy, 328; studies on, 387, 650, 785.  
Degesec seed disinfection apparatus, 519.  
*Delphinium*, *Bacterium viridiflavum* can infect, 16.  
—, celery virus 1 on, in U.S.A., 615.  
—, *Phytophthora* on, in U.S.A., 147.  
—, — *parasitica* on, in Rhodesia, 678.  
—, *Pseudomonas endiviae* can infect, 16.  
—, *Sclerotium delphinii* on, in U.S.A., 147.  
—, — *rolfsii* on, in S. Africa, 426.  
—, tomato spotted wilt can infect, 404.  
Dermatiaceae associated with 'wet wood' of pine and spruce, 803.  
*Dematiium*, industrial fermentation of pentosans by, 604.  
— on fruit and vegetables in storage in U.S.A., 322.  
— *pullulans*, see *Pullularia pullulans*.  
*Dematophora glomerata* on vine in Italy, 196; renamed *Vialaella glomerata*, 196.  
*Dendroctonus frontalis*, relation of, to *Ceratostomella ips* and *C. pini* on pine in U.S.A., 68.  
*Deodar* (*Cedrus libani* var. *deodara*), *Fusarium fuliginosporum* on, in Italy, 680.  
Dermatomycotic allergies and their cure by vaccines, 308.  
Dermatophytes, classification of the, 101, 580.  
*Derris microphylla*, *Diplodia*, *Ustulina*, and *Xylaria* on, in Java, 153.  
*Deuterophoma tracheiphila* on lemon in Cyprus, 83; in Italy, 505, 680; varietal resistance to, 680.  
Dewberry (*Rubus*), *Cercospora rubi* on, in U.S.A., 774.  
— diseases in U.S.A., 642.  
—, *Elsinoe veneta* on, in U.S.A., 181.  
—, *Mycosphaerella dubia* on, in U.S.A., 775; perfect stage of *Cercospora rubi*, 775.  
*Dianthus caryophyllus*, see Carnation.  
— *plumarius*, beet curly top affecting, in U.S.A., 171.  
*Diaporthe* can infect grapefruit and orange, 96.  
— on citrus in U.S.A., 96.  
—, sporulation in, 453.  
— *citri* on citrus, control, 96, 693; occurrence in U.S.A., 96, 564, 693.  
— on grapefruit, control, 161; occurrence in New S. Wales, 161; in Trinidad, 182, 754; in U.S.A., 564.  
— on lemon in New S. Wales, 161.  
— on lime in U.S.A., 564.  
— on orange, control, 161; occurrence in the Argentine, 15; in New S. Wales, 161; in Rhodesia, 427, 678; in Uruguay, 15; in U.S.A., 564.  
—, *Phomopsis citri* imperfect stage of, 15.

[*Diaporthe*] (?) *eres* on holly in U.S.A., 587.  
 — *parasitica* on pear in Belgium, 679.  
 — *perniciosa*, conversion of one strain of, into another, 249.  
 — — on apple in England, 771.  
 — — *umbrina* on rose in Japan, 498.  
*Diplotyon morbosum* on cherry and plum, control, 773; factors affecting, 772; *Hormodendrum* stage of, 593, 772; occurrence in Canada, 43, 177, 593, 772; overwintering of, 43; studies on, 177, 593, 772; *Trichothecium roseum* parasitizing, 177.  
*Didymascella thujina* on *Thuja occidentalis* in U.S.A., 794.  
*Didymella applanata* on raspberry, breeding against, 775; control, 595; occurrence in France, 595; in Germany, 775; in U.S.A., 181; varietal susceptibility to, 775.  
*Didymellina macrospora*, *Heterosporium gracile* conidial stage of, 448.  
 Die-back of coffee in India, 164.  
 — of pear in Holland, 12.  
 — of pepper in Sumatra, 152.  
*Diffugia globulosa*, *Pedilospora dactylopaga* on, in U.S.A., 99.  
*Digitaria*, *Piricularia* on, in Uganda, 82.  
*Dilophia graminis* on wheat in Italy, 750.  
*Dilophospora alopecuri* on oats, rye, and wheat in Germany, 296.  
*Dioscorea*, see Yam.  
*Diospyros kaki*, see Persimmon.  
*Diplorcarpon rosae* on rose, in England 313; in U.S.A., 382.  
*Diplodia* can infect grapefruit, maize, orange, and watermelon, 564.  
 — on cacao in the Philippines, 567.  
 — on citrus and cotton in U.S.A., 564.  
 — on *Derris microphylla* in Java, 153.  
 — on lime in U.S.A., 86.  
 — on sweet potato in U.S.A., 564.  
 (?) — on timber in Malaya, 540.  
 — *frumenti* on maize, 564.  
 — *gongrogena* on aspen and poplar in Austria, 134.  
 — *gossypina* on cotton in U.S.A., 629.  
 — *hibiscina* var. *sabdariffae* on *Hibiscus sabdariffa* in India, 470.  
 — *macrospora* on maize in Brazil, 355; in U.S.A., 86, 564.  
 — *mutila* on apple in Jersey, 423.  
 — *natalensis* on citrus, factors affecting, 86, 564; occurrence (?) in Sierra Leone, 428; in U.S.A., 86, 564.  
 — — on grapefruit and lime in U.S.A., 564.  
 — — on mango and mangosteen in Burma, 286.  
 — — on orange, control, 30, 86; occurrence in Palestine, 30, 577; in U.S.A., 86, 564.  
 — — on timber in U.S.A., 729.  
 — *phoenicum* on *Phoenix canariensis* in Tunis, 429.  
 — *pinea* (?) on *Cupressus lawsoniana* in New Zealand, 65.  
 — — on pine (?) in New Zealand, 65; in Rumania, 483.  
 (?) — — on *Pseudotsuga taxifolia* in New Zealand, 65.  
 [*Diplodia*] *pseudodiplodia*, see *Physalospora obtusa*.  
 — *rhododendri* on rhododendron in Germany, 174.  
 — *tubericola* on sweet potato in U.S.A., 118, 528.  
 — *warburgiana* on lemon in Cyprus, 742.  
 — *zeae* on maize, control, 221, 232, 751; factors affecting, 221, 437, 751; immunization against, 751; losses caused by, 437; occurrence in U.S.A., 86, 220, 232, 437, 751.  
*Diplosporium album* on pear in Holland, 12.  
*Dipteryx odorata*, marasmoid thread-blight of, in Trinidad, 256.  
*Dirphia lauta*, *Sporotrichum globuliferum* and *S. paranense* on, in the Argentine, 98.  
*Disaeta arbuti* synonym of *Cryptostictis arbuti*, 66.  
*Discula pinicola* in water of timber mills in Sweden, 274.  
*Dodonaea viscosa*, spike-like disease of, in India, 539.  
*Dog*, *Achorion caninum* on the, in Italy, 581.  
*Dolichos lablab*, mildew of, in India, 561.  
 — —, *Sphacelona* on, in Uganda, 82.  
 — *sesquipedalis* and *D. sinensis*, see *Vigna unguiculata*.  
*Dothidea noxia* on beech in Holland, 12.  
 — — on oak in Germany, 476; *Fusicoccum novium* pycnidial stage of, 476.  
*Dothidella trifolii* on clover in Estonia, 241; in U.S.A., 367; synonymy of, 367.  
*Dothiorella* on *Acacia farnesiana* in Italy, 680.  
 — on lemon in Cyprus, 83, 742.  
 — on mango in Burma, 286; in transit from India, 518.  
 — *fraxinicola* can infect ash, 221.  
 — *gregaria* on poplar in the Argentine, 15.  
 'Dowicide', use of, against blue stain of timber in Finland, 729.  
*Draba nemorosa* var. *hebecarpa*, *Cystopus candidus* var. *microspora* on, in Japan, 2.  
*Drechslera* synonym of *Pyrenophora*, 125.  
*Dritomitic sulphur*, use of, against *Venturia inaequalis* on apple, 683.  
 Drought mortality of tea in Ceylon, 657.  
 — spot of apple in U.S.A., 592.  
 Dry and heart rot of beet, boron deficiency in relation to, 141, 256, 548, 551, 552; control, 73, 282, 552, 613, 732, 733, 808; factors affecting, 282, 552, 808; losses caused by, 282; occurrence in Belgium, 808; in Europe, 548; in France, 282; in Germany, 73, 141, 613, 733, 808; in Holland, 732, 733; in Irish Free State, 551; in U.S.S.R., 552; varietal susceptibility to, 552.  
 'Dry land' foot rot of wheat in U.S.A., 497.  
 — side rot of pineapple in Mauritius, 84.  
 — 'tan', use of, in tannin seed disinfectants, 114.  
 Du Bay 738, composition and use of, against *Pythium de Baryanum* on tomato, 146.

*Durio zibethinus*, *Phytophthora palmivora* on, in Malaya, 46.

Dusting apparatus, 21, 48, 214, 598, 654, 716.

— injury, 500, 651.

— versus spraying against *Phytophthora infestans* on potato, 607.

Dusts, German methods of testing, 518.

'Dwarf' disease of mulberry in Central Asia and Japan, 462.

— of rice in Japan, 468; overwintering of, (?) in *Astragalus sinicus*, 469; transmission of, by *Nephrotettix apicalis* var. *cincticeps*, 468.

— of sugar-cane in Queensland, 333.

Dwarfing of potato in Italy, 786.

Dyes, aniline, photodynamic action of, on maize streak virus, 146, 246; on plant viruses, 186.

—, toxicity of, to *Aspergillus niger*, 105; to *Candida pinoyi*, 584; to *Endomyces cortese* and *Geotrichoides [C.] krusei*, 583; to *Monilia* on man, 758; to moulds in pharmaceutical preparations, 115; to *Mycotorula aegyptiaca*, *Saccharomyces gracilis caverniculae*, *Torulopsis bergami* and *T. cabrini*, 584; to *Torula* and *Trichophyton* on man, 758; to *T. mentagrophytes* and *T. rubrum*, 105; to *Verticillium albo-atrum*, *V. amaranti*, *V. dahliae*, and *V. tracheiphilum*, 765.

—, see also Malachite green.

Dying-off of *Abies pectinata* in Czechoslovakia, Europe, Germany, and Poland, 481.

— of fruit trees in Italy, 449.

— of plum in Italy, 800.

— of *Zostera marina*, factors affecting, 599, 709; occurrence in Denmark, 50, 326; in England, 599; in France, 600; in Norway, 326; in Sweden, 326, 709; in U.S.A., 599.

*Dysdercus delauneyi*, transmission of *Nematospora* on cotton by, in St. Vincent, 164.

— *fasciatus* transmitting *Nematospora coryli* on cotton in Rhodesia, 358; *N. gossypii* on cotton in Rhodesia, 97, 358.

— *intermedius* transmitting *Nematospora coryli* in cotton in Rhodesia, 358; *N. gossypii* on cotton, 97; in Rhodesia, 358.

— *nigrofasciatus* transmitting *Nematospora coryli* and *N. gossypii* on cotton in S. Africa, 357.

— *superstitiosus* transmitting *Nematospora coryli* and *N. gossypii* on cotton in Rhodesia, 358.

'Eau céleste' injury, 75. (See also Cuprammonium sprays.)

*Echinodontium tinctorium* on *Abies concolor* in U.S.A., 205.

*Ectostroma oryzae*, *Entyloma oryzae* on rice wrongly attributed to, in Japan, 331.

— synonym of *Entyloma oryzae*, 498.

Eggplant (*Solanum melongena*), bunchy top of tomato can infect, 800.

[Eggplant], celery virus 1 on, in U.S.A., 615.

—, (?) *Corticium solani* on, in U.S.A., 151.

—, cucumber (yellow) mosaic can infect, 534.

—, damping-off of, in U.S.A., 671.

—, *Macrophomina phaseoli* on, in Cyprus, 83.

—, (?) *Peronospora tabacina* on, in Australia, 724.

—, *Phomopsis vexans* on, in U.S.A., 151.

—, *Phytophthora parasitica* on, 191.

—, potato calico disease can infect, 787.

—, *Puccinia tubulosa* on, in the Philippines, 608.

—, (?) *Pythium* on, in U.S.A., 151.

—, — *aphanidermatum* can infect, 7.

—, — *ultimum* on, in U.S.A., 383.

—, *Sclerotium rolfsii* on, in the Philippines, 315.

—, tobacco mosaic on, inheritance of ability to localize virus of, 127.

—, — virus 1 can infect, 197.

—, tomato spotted wilt affecting, in U.S.A., 201.

—, *Verticillium albo-atrum* on, control, 74, 283, 684; factors affecting, 74; in U.S.A., 74, (?) 283, 684; transmission of, by seed, 283; varietal susceptibility to, 74.

—, *dahliae* on, in U.S.A., 283.

—, virus disease of, in Rumania, 215.

Eggs, *Alternaria*, bacteria, *Cephalosporium*, *Cladosporium*, *Chaetomium*, *Fusarium*, *Hormodendrum*, *Myceliophthora*, *Penicillium*, *Stemphylium*, *Tilachlidium*, and *Zygodesmus* in, in France, 237.

'Eisenfleckigkeit' of potato, 253; in Germany, 389, 717.

*Elaeis guineensis*, see Oil palm.

*Eleusine aegyptiaca*, *Helminthosporium nodulosum* on, in India, 440.

— *coracana*, *Gibberella saubinetii* on, in Uganda, 82.

—, *Helminthosporium leucostylum* and *H. nodulosum* on, in India, 161, 440.

—, *Piricularia* on, in Uganda, 81.

Elgon die-back of coffee in Kenya, etiology of, 426.

Elm (*Ulmus*), *Cephalosporium* on, in U.S.A., 203, 406.

—, *Ceratostomella ulmi* on, control, 63, 64, 134, 203, 476, 536, 537, 665; factors affecting, 536; legislation against, in England, 735; in U.S.A., 326, 480; notes on, 203, 406; occurrence in Austria and Belgium, 264; in Bulgaria, 264, 537; in Czechoslovakia, 264, 536; in England, 264; in France, 133, 264; in Germany, 264, 476, 536; in Holland, 264, 664; in Hungary, 264; in Italy, 133, 264, 664; in Jugo-Slavia, (?) Poland, and Portugal, 264; in Rumania, 215, 264; in Switzerland, 264; in U.S.A., 63, 64, 203, 264, 338, 406, 476, 480, 537, 663; in various countries, 664; *Pseudotarsonemoides innumerabilis* in relation to, 665; sporulation of, 134, 406; studies on, 134, 406, 536, 664;

transmission of, by air currents, 611; by bark beetles, 336; by *Hylurgopinus rufipes*, 476; by mites, (?) 63, 476; by *Scolytus affinis*, 537; by *S. multistriatus*, 133, 264, 536, 665; by *S. pygmaeus*, 536; by *S. sulcifrons*, 133, 264, 537; by *S. scolytus*, 536, 665; varietal resistance to, 133, 536, 664, 665, 726.

[Elm], *Chalaropsis thielavioides* on, in U.S.A., 726.

—, *Coniothyrium* on, in U.S.A., 203, 537.

—, *Cytosporina* (?) *ludibunda* on, in U.S.A., 537.

—, *Gnomonia ulmea* on, in U.S.A., 203.

—, mosaic in Bulgaria, 462.

—, *Nectria cinnabrina* on, 665.

—, *Phoma* on, in U.S.A., 537.

—, — 'B' on, in U.S.A., 203.

—, *Pseudomonas lignicola* on, in Europe, 536.

—, *Sclerotinia* on, in U.S.A., 222.

—, *Verticillium* on, in U.S.A., 203.

—, — *albo-atrum* on, 664; in U.S.A., 406.

*Elsinoe piri* on apple, interception of, in U.S.A., from Switzerland, 815; occurrence in the Argentine, 223.

— on pear in the Argentine, 223.

— *veneta* on dewberry in U.S.A., 181.

— on raspberry in U.S.A., 181, 219.

*Elymus*, *Puccinia rubigo-vera* on, physiologic specialization in, 746.

*Emilia*, tomato spotted wilt affecting, in U.S.A., 404.

— *sagittata*, celery virus 1 can infect, 5; occurrence in U.S.A., 615.

*Empusa grylli* on grasshoppers in Canada, 579; in U.S.A., 497.

— on locusts in Rhodesia, 427; in S. Africa, 98, 234.

— *sphaerosperma*, see *Entomophthora sphaerosperma*.

*Enantiothamnus braulti* in Italian leavens, 383.

*Endive* (*Cichorium endivia*), *Pseudomonas endiviae* on, 16.

—, — (?) *intybi* on, in Germany, 418.

*Endocochlus asteroides* on *Amoeba terricola* in U.S.A., 360.

*Endoconidiophora*, *Ceratostomella* spp. with endoconidium transferred to, 729.

— *adiposa*, *Ceratostomella adiposa* renamed, 729.

— *coeruleascens* on pine and spruce in U.S.S.R., 68.

— on timber in U.S.A., 729; in U.S.S.R., 270.

— renamed *Ophiostoma coeruleascens*, 274.

— *moniliformis* on timber in U.S.A., 729.

— *paradoxa*, *Ceratostomella paradoxa* renamed, 729.

—, see also *Ceratostomella*.

*Endodermophyton* regarded as a superfluous genus, 101.

— *tropicale*, see *Trichophyton concentricum*.

*Endomyces*, serological reaction of, 34.

— *albicans* on man in France, 581, 582.

— *capsulatus* and its var. *isabellinus* synonyms of *Blastomycetes dermatitidis*, 100; of *Gilchristia dermatitidis*, 99, 582.

[*Endomyces*] *cortese*, toxicity of dyes and metallic salts to, 583.

— *dermatitidis* on man as a type mycosis, 631; occurrence in U.S.A., 99; synonymy of, 99, 100, 582.

*Endophyllum semperivivum*, receptive hyphae of, 464.

*Endothia parasitica* on chestnut, control, 727; occurrence in U.S.A., 611, 726, 727, 800; regeneration of stands depleted by, 800; varietal resistance to, 611.

*Engleromyces goetzei* on bamboo in the Belgian Congo, 333.

*Entamoeba ranarum*, *Nucleophaga ranarum* on, in France, 757.

Entomogenous fungi on fruit insect pests in the Argentine, 98, 630.

*Entomophthora apropophorae*, notes on, 443.

— *bullata* parasitizing flies in U.S.A., 794.

— (?) *sphaerosperma* on *Thrips tabaci* in U.S.A., 33.

*Entomosporium* on loquat in Japan, 498.

*Entyloma calendulae* on *Calendula officinalis*, cytology and life-history of, 654.

— *cichorii* on chicory in Poland, 398.

— *linariae*, *E. lobeliae*, and *E. menispermi*, cytological note on, 433.

— *oryzae* on rice, *Ectostroma oryzae* and *Sclerotium phyllachoides* in relation to, 331, 498; occurrence in Japan, 331, 498; in the Philippines, 331; in U.S.A., 331.

— *ranunculi* on *Ranunculus ficaria*, 654.

— *zinniae* on *Zinnia pauciflora* in S. Africa, 793.

*Epacris impressa*, asymbiotic development of, in Australia, 462.

*Ephelidium aurantiiorum*, a parasite of, and distinct from *Botryodiplodia lecanidion*, 793.

*Epichloe typhina* on *Agrostis vulgaris*, *Dactylis glomerata*, and *Phleum pratense* in Germany, 766.

*Epicoccum* as a constituent of sooty moulds in New S. Wales, 60.

— *purpurascens* on pine and spruce in U.S.S.R., 68.

— on rice in Japan, 653.

*Epidermophyton*, characters of, 101.

— on man in Hungary, 104.

—, toxicity of cresol and mercurochrome to, 758.

— *floccosum* on man, 759; specific differentiation of, by Wood's rays, 510.

—, Kaufmann-Wolf's, a variant of *Trichophyton mentagrophytes*, 759; occurrence on man in Hungary, 104.

*Epilobium*, *Erysiphe* on, inheritance of resistance to, 464.

*Epirrhizanthes elongata*, Phycomycetoid endophyte of, in Java, 248.

*Epitrix cucumeris*, as vector of *Actinomyces scabies* in U.S.A., 716.

*Eremothecium ashbyii* on cotton in the Sudan, 693.

Erゴsterol, use of mould tissue in production of, 603.

Ergot alkaloids, 93, 511, 696, 697.  
*Erica hielalis* and *E. nivalis*, *Phytophthora* (?) *syringae* on, in England, 637.  
*Eriobotrya japonica*, see Loquat.  
 Erysiphaceae, Chinese species of, 795.  
 —, prevalence of, in Germany, in 1934, 249.  
*Erysiphe* on *Epilobium*, inheritance of resistance to, 464.  
 — *artemisiae* on *Artemisia vulgaris* in Estonia, 530.  
 — *cichoracearum* on *Aster rotundifolius* in U.S.A., 240.  
 — — on Cucurbitaceae in France, 77.  
 (?) — — on *Hibiscus esculentus* in Sierra Leone, 428.  
 (?) — — on mango in S. Africa, 426.  
 (?) — — on potato in Cyprus, 83.  
 — — on tobacco, control, 335; factors affecting, 533; occurrence in Java, 533; in Madagascar, 335; in Tanganyika, 60; varietal susceptibility to, 533.  
 (?) — — on vegetable marrow in England, 9.  
 — *communis* on clover in U.S.S.R., 52.  
 — *graminis* on *Agropyron repens*, nature of resistance to, 711.  
 — — on barley, breeding against, 625; control, 433; factors affecting, 26, 92, 689; genetics of resistance to, 92; nature of resistance to, 25, 26, 711; occurrence in Austria, 624; in Germany, 26, 92, 433, 624, 689; in Rumania, 624; in U.S.A., 25; physiologic forms of, 92, 624; studies on, 25, 92; varietal susceptibility to, 92.  
 — — on cereals in Germany, 571.  
 — — on *Dactylis glomerata*, *Festuca pratensis*, and *Phalaris arundinacea* in Germany, 572.  
 — — on rye in Germany, 26, 689.  
 — — on wheat, effect of, on resistance to *Puccinia triticina*, 88; factors affecting, 26; genetics of resistance to, 229; nature of resistance to, 26, 711; occurrence in Germany, 26; in Tasmania, 425; in U.S.A., 88, 229; in U.S.S.R., 225; physiological forms of, 229; study on, 229; varietal resistance to, 225, 229.  
 — *polygoni* on bean, cultivation of, on detached leaves, 207.  
 — — on clover, effect of, on physiology, 174; factors affecting, 572; occurrence in Estonia, 241; in Germany, 572; (?) in U.S.A., 287; varietal resistance to, 288.  
 — — on peas in U.S.A., 287.  
 (?) — — on *Polygonum aviculare* in U.S.A., 288.  
 — — on swedes in Wales, 808.  
 — *valerianae* on *Valeriana officinalis* in Estonia, 530.  
*Eschscholtzia californica*, aster yellows affecting, in U.S.A., 171.  
 Etch of tobacco in U.S.A., 685; varietal susceptibility to, 401.  
 — (severe) of tomato in relation to tobacco mosaic, 782.

Ethyl mercury chloride, use of, against blue stain of timber, 612, 729.  
 — — phosphate, a constituent of Du Bay 738, 146; of new improved ceresan, 745.  
 — — —, toxicity of, to *Sclerotium delphinii*, 147.  
 — — —, use of, against *Corticium solani* on lettuce, 74; against maize seed coat injury, 355.  
*Eucalyptus*, *Physalospora eucalyptina* on, interception of, in U.S.A., from Mexico, 816.  
 —, (?) *Stilbum* on, in Tanganyika, 13, 678.  
 — *globulus*, *Cercospora epicoccooides* on, in Japan, 471.  
 — *vininalis*, *Melanconium* on, in the Argentine, 223.  
*Euchlaena mexicana*, *Aplanobacter stewarti* on, in U.S.A., 753.  
 — —, celery virus 1 affecting, 93; in U.S.A., 615.  
*Eugenia malaccensis*, *Puccinia psidii* on, in Jamaica, 792.  
*Euphorbia peplus*, *Melampsora euphorbiae* f. sp. *pepli* on, albino form of, in Germany, 53.  
*Eurotium repens*, see *Aspergillus repens*.  
 Eusol, composition and use of, against *Gloeodes pomigena* on orange, 754.  
*Eutettix tenellus*, artificial feeding of, 550.  
 — —, transmission of beet curly top by, in U.S.A., 171, 339, 340, 550.  
*Eutorulopsis* not accepted as a genus, 193.  
*Exanthema* of citrus in U.S.A., 628; suggested virus nature of, 505.  
*Exobasidium burtii* on *Rhododendron albiflorum* in U.S.A., 65.  
 — *camelliae-oleiferae* on *Camellia oleifera* in Japan, 532.  
 — *ledi* on *Ledum glandulosum* in U.S.A., 65.  
 — *parvifolii* on *Vaccinium parvifolium* in U.S.A., 65.  
 — *vaccinii* on *Arctostaphylos* in U.S.A., 66.  
 — — on rhododendron in Germany, 174; in U.S.A., 66.  
 — — on *Vaccinium* in U.S.A., 66.  
 — *vaccinii-uliginosi* on *Arctostaphylos columbiana*, *Phyllocoete empetrifoliformis*, *Rhododendron californicum*, and *Vaccinium* in U.S.A., 66.

*Fabrea maculata* on pear in U.S.A., 381.  
 — — on *Raphiolepis delacouri*, intercepted from the Argentine, 816.  
*Fagopyrum esculentum*, see Buckwheat.  
*Fagus*, see Beech.  
 False blossom of cranberry in U.S.A., 776.  
*Favolus*, key to species of, 795.  
*Feijoa sellowiana*, *Phymatotrichum omnivorum* on, in U.S.A.; 562.  
 Female sterility virus of tobacco identical with tomato woodiness, 131.  
 Fern leaf of tomato, see Mosaic of tomato.  
 Ferns, *Omphalia flava* can infect, 184.  
 Ferric citrate, use of, against citrus chlorosis, 753.  
 — sulphate impregnated wraps, use of, against *Botrytis cinerea* on vine, 214.

[Ferric] tartrate, use of, against citrus chlorosis in U.S.A., 561.

**Ferric** sulphate, use of, against citrus chlorosis, 561, 753; against little leaf and rosette of fruit trees, 768; against *Ventura inaequalis* on apple, 495. (See also Iron sulphate.)

Fertilizers, effect of, on *Aphanomyces euteiches* on peas, 151; on *Bacillus ananas* and *Bacterium ananas* on pine-apple, 776; on *Bact. angulatum* on tobacco, 403; on *Bact. malvacearum* on cotton, 304; on *Bact. solanacearum* on tomato, 658; on *Bact. tabacum* on tobacco, 403; on *Botrytis cinerea* on Cactaceae, 699; on bronze leaf wilt of coco-nut, 579; on brown heart of turnips, 70, 547; on *Cercosporaella herpotrichoides* on wheat, 230; on citrus bronzing, 442; on coffee chlorosis, 755; on *Corticium solani* on potatoes, 527; on *Cycloconium oleaginum* on olive, 706; on *Cytosporina ludibunda* on apple, 40; on disease resistance, 520; on dry and heart rot of beets, 73, 613, 733, 808; on *Erysiphe graminis* on cereals, 571; on *Dactylis glomerata*, *Festuca pratensis*, and *Phalaris arundinacea*, 572; on *Fusarium lateritium* on apple, 40; on grey speck of oats, 29, 575; on *Helminthosporium teres* on barley, 159; on low temperature breakdown of apple, 243; on magnesium deficiency of potatoes, 649; on manganese excess disorder of plants, 404; on *Ophiobolus graminis* on barley, 621; on wheat, 229, 497, 621; on orange mycorrhiza, 710; on peach chlorosis, 320; on *Peronospora parasitica* on cabbage, 277, 546, 565; on *Phytophthora omnivorum* on cotton, 442; on many trees, 562; on *Phytophthora infestans* on potato, 606; on *Plasmoidiophora brassicae* on cabbage, 277, 807; on crucifers, 414; on rape, 151; on *Puccinia* on cereals 18, 19; on *P. graminis* on wheat, 88; on (?) *Pythium* on lucerne, 241, 588; on resistance to disease, 520; on *Sclerotium rhizodes* on *Phalaris arundinacea*, 39; on *S. trifoliorum* on clover, 39; on soggy breakdown of apple, 593; on sorghum root rot, 95; on *Sphaerotheca pannosa* on rose, 37; on stunting of rice, 286; on *Thielaviopsis basicola* on tobacco, 403; on tobacco virus 6, 660; on *Ustilago tritici* on wheat and *U. nuda* on barley, 296; on 'white bud' of maize, 576; on white spotting of clover, grasses, and oats, 572.

*Festuca*, *Corticium fuciforme* on, in Great Britain, 587.

— *elatior*, *Helminthosporium dictyoides* on, *Pyrenophora* ascigerous stage of, 515.

— *octoflora*, *Puccinia lolii* can infect, 435.

— *pratensis*, *Erysiphe graminis* on, in Germany, 572.

— —, *Puccinia* on, sporulation in, 52.

— —, *lolii* on, sporulation in, 53.

— *rubra*, *Puccinia* on, sporulation in, 52.

*Ficus*, *Omphalia flava* can infect, 184.

*Fig* (*Ficus carica*), *Botrytis cinerea* on, in England, 617.

—, *Cerotelium fici* on, in India, 560.

—, *Hendersonula toruloides* on, in Cyprus, 83.

— leaf mottle in Western Australia, 706.

—, little leaf of, in U.S.A., 768.

— mosaic in Bulgaria, 462.

—, *Phoma cinerescens* on, in S. Africa, 426.

—, *Rhizoctonia microsclerotia* on, in U.S.A., 416.

—, *Rhizopus nigricans* on, in Japan, 498.

—, *Stilbum cinnabarinum* on, in U.S.A., 459; *Megalonectria pseudotrichia* ascigerous stage of, 459.

Fiji disease of sugar-cane in Queensland, 333; transmission of, by *Perkinsiella saccharicida*, 333.

Filberts, see *Corylus*.

Fir, see *Abies*.

*Firmania simplex*, *Rhizoctonia* (?) microsclerotia on, in U.S.A., 416.

*Fistulina hepatica* on oak in U.S.A., 663.

*Flavobacterium* (?) *diffusum* on oil palm in Malaya, 31.

Flax (*Linum usitatissimum*), *Aphanomyces* (?) *cladogamus* on, in U.S.A., 417.

—, *Asterocystis radicis* on, in U.S.A., 362.

—, bacterial diseases of, in U.S.S.R., 634.

—, *Colletotrichum lini* on, in Germany, 763.

— diseases in Holland, 608.

—, *Fusarium* on, in U.S.A., 363.

—, — *lini* on, control, 763; factors affecting, 310, 634; occurrence in the Argentine, 720; in Germany, 763; in Japan, 634; in Switzerland, 310; in U.S.A., 362; studies on, 310, 362; varietal resistance to, 310, 362, 634.

—, — *solani* var. *martii* f. 1 on, in U.S.A., 363.

—, — *vasinfectum* var. *zonatum* on, in U.S.A., 363.

—, *Melampsora lini* on, heterothallism in, 170, 309.

—, *Pythium* on, in U.S.A., 588.

—, — *megalacanthum* on, in U.S.A., 362.

—, *Rhizoctonia* on, in U.S.A., 362.

— root rot in U.S.A., 363.

—, *Thielavia basicola* on, in U.S.A., 362.

—, see also Linseed.

Flies (*Muscids*), *Entomophthora bullata* on, in U.S.A., 794.

—, *Hirsutella radiata* on, in British Guiana, 443.

Flower diseases, annotated list of, in Jersey, 493.

— spot of *Rhododendron indicum* in U.S.A., 365, 586.

Fluralsil, use of, against *Merulius lacrymans* on timber, 542.

'Fluxit', use of, as a spreader, 562.

*Foeniculum*, *Oidiopsis taurica* on, in Cyprus, 83.

— *vulgare*, (?) *Bacillus carotovorus* on, in Italy, 681.

*Fomes*, division of, into *Leuco-* and *Fusco-*  
*Fomes*, 795.  
 —, key to species of, 795.  
 — *albomarginatus* on *Shorea robusta* in India, 193.  
 — *annosus* on larch, pine, and spruce in Great Britain, 804.  
 — on trees in Germany, 247; in Poland, 663.  
 —, use of, in tests of timber preservatives, 276.  
 — *conchatus* on mango in India, 193.  
 — *cryptarum* on timber in England, 136.  
 — *ferruginosus* on *Buxus sempervirens* in U.S.S.R., 62.  
 — *fomentarius*, distribution of, in India, 795.  
 — on walnut in U.S.S.R., 62.  
 — *igniarius* on walnut and other trees in U.S.S.R., 662.  
 — *juniperinus* on *Juniperus excelsa* in U.S.S.R., 62.  
 — *laricis* on pine in U.S.A., 205.  
 — *lignosus* on *Acacia* in Java, 153.  
 — — on cacao in the British Empire, 87.  
 — — on cassava in Malaya, 81.  
 — — on coffee in the Cameroons, 31.  
 — — on *Hevea* rubber in Ceylon, 145; in Malaya, 790.  
 — — on oil palm in Malaya, 357.  
 — *noxius* on *Bauhinia* in Japan, 532.  
 — — on cacao in the British Empire, 87.  
 — — on coffee in the Cameroons, 31.  
 — — on *Hevea* rubber in Malaya, 790.  
 — — on oil palm in Malaya, 81, 357.  
 — — on *Pterocarpus indicus*, *Swietenia mahagoni*, and *S. macrophylla* in Java, 153.  
 — *pini* preferred as a name for *Trametes pini*, 67.  
 — *pinicola*, distribution of, in India, 795.  
 — — on pine in Burma and India, 193.  
 — — on *Tsuga brunoniana* in India, 193.  
 — *pomaceus* on plum in England, 375.  
 — *ribis* on pear in U.S.S.R., 62.  
 — *rimosus* on *Pistacia lentiscus* in U.S.S.R., 62.  
 — *robustus* var. *tsugina*, *Fomitiporia tsugina* renamed, 795.  
 — *subroseus*, *Trametes subroseus* renamed, 795.  
 — *ulmarius* on *Liquidambar formosana* in Japan, 532.  
 — *yucatanensis* on *Cathormion altissimum* in Sierra Leone, 428.  
*Fomitiporia tsugina* renamed *Fomes robustus* var. *tsugina*, 795.  
 Forest trees, diseases of, Russian textbook on, 337; transmission of, by seed, 65.  
 — —, toxicity of arsenic fumes to, in Germany, 725.  
 Formaldehyde as a constituent of sub-limatoform, 572.  
 — injury, 78, 90, 688, 745.  
 —, toxicity of, to *Ceratostomella pini*, 276; to *Pseudomonas mors-prunorum*, 641.  
 —, use of, against *Bacterium malvacearum* on cotton, 33; against *Bact. solanae-carum* on potato, 790; against *Botrytis*

*cinerea* on vine, 491; against *B. tulipae* on tulip, 586; against *Brachysporium* on rice, 468; against *Chalaropsis theiavioidea* on elm, 726; on walnut, 408; against *Cladosporium fulvum* on tomato, 78; against *Corticium solani* on beet, 671; on potato, 527; against damping-off of chilli, cucumber, eggplant, melon, peas, and tomato, 671; against dry and heart rot of beet, 282; against fruitlet black rot of pineapple, 182; against *Fusarium culmorum* on barley, oats, and wheat, 688; against *F. poae* on carnation, 513; against grape wastage in S. Africa, 491; against grey speck of oats, 393; against *Helminthosporium sativum* on barley, oats, and wheat, 688; against *Leptosphaeria salvinii* on rice, 468; against *Ophiobolus Miyabeanus* on rice, 468; against *Polystictus versicolor* on timber, 413; against *Pythium* on beet and clover, 588; against (?) *P.* on lucerne, 241, 588; against *P. de Baryanum* on *Viola tricolor*, 38; against *P. ultimum* on beet, 671; against rice diseases, 221; against *Sclerospora graminicola* on *Setaria italica*, 577; against squash decays, 684; against *Thielaviopsis basicola* on tobacco, 403; against tobacco mosaic, 658; against tomato fruit rots, 263; against *Ustilago avenae* on oats, 20, 572, 745; against *U. bromivora* on *Bromus unioloides*, 572; against *U. hordei* on barley, 572, 745; against *U. kolleri* on oats, 180, 572, 745; against vegetable diseases, 277; against wheat bunt, 22, 90, 380, 745; against wool moulding, 763; as a soil disinfectant, 460; as a wound disinfectant, 567.

[Formaldehyde] dust, use of, against (?) *Corticium solani* and (?) *Pythium* on vegetables, 151.

—, hot, use of, against *Actinomyces scabies* and *Corticium solani* on potato, 118.

Formo-dust, use of, against (?) *Pythium* and *Rhizoctonia* on beet, chilli, and tomato, 563.

Fortunella, see Kumquat.

Fourth disease of sugar-cane, control, 530; effect of, on yield, 332; occurrence in Hawaii, 530; in Mauritius, 84; in Queensland, 332; transmission of, 84, 530.

Fowl, *Mucor javanicus* in the, in U.S.A., 694.

—, use of barley infected with *Gibberella saubinetii* as feed for the, 231.

*Fragaria vesca*, see Strawberry.

*Frankliniella* transmitting tomato spotted wilt to poppy and tobacco in U.S.A., 404.

— *insularis* transmitting tomato spotted wilt in Canada, 610.

*Fraxinus*, see Ash.

Freezing injury of stored apples in U.S.A., 592.

Frenching of grapefruit in U.S.A., 441; of orange in U.S.A., 441, 481.

'Frisolée' of potato synonymous with crinkle, 246.

Frost injury in relation to *Dasyscypha calycina* on larch and *Phomopsis pseudotsugae* on Douglas fir in England, 264.

Fruit disease control in the Argentine, 98; in Denmark, 558; in Morocco, 517; in U.S.A., 493, 642.

—, processed, *Byssochlamys fulva* on, in England, 775.

—, storage rots in England, 322; in U.S.A., 322, 461.

—, woodiness of tomato, see Woodiness of *Fumago* on fruit trees in Canada, 44.

—, *sacchari* on sugar-cane in the Argentine, 532.

Fungi, British book on edible and poisonous, 284.

—, critical notes on cultural technique for, 327.

—, list of, in Bombay, 654; in Brazil, 634; in Denmark, 59; in Estonia, 730; in India, 193, 470; in Japan, 532; in Jersey, 493; in Madagascar and equatorial Africa, 333; in N. Ireland, 796; in Queensland, 124; in Scotland, 193; in S. Africa, 793; in Spain, 396; in U.S.A., 59, 193, 258, 794; in Venezuela, 397, 470. (See also Plant diseases.)

—, method of preserving cultures of, 461.

—, utilization of, in the production of food, 603.

Fungicidal activity, atomic weight of elements in relation to their, 244.

Fungicides, manufacture of, in France, 779; in U.S.S.R., 47.

—, officially approved, in Austria, 518; in Germany, 380.

—, regulation of, in Denmark, 379.

—, Russian book on, 324.

—, standardization of, 596, 598.

Fusariol, effect of, on metals and vice versa, 597.

—, use of, against *Helminthosporium sativum* on barley, 299.

—, 157, use of, against *Calonectria graminicola* on rye, *Helminthosporium graminium* on barley, *Ustilago avenae* on oats, and wheat bunt, 20.

—, dusts 844 and 1416, use of, against wheat bunt, 21.

*Fusarium*, cellulose decomposition by, 584.

—, in butter, 761.

—, in eggs in France, 237.

—, monograph on the genus, 709.

—, on *Amaranthus tricolor* in Italy, 765.

—, on *Antirrhinum majus* in S. Africa, 238.

—, on apple in Canada, 592.

—, on aster, China, in Germany, 172.

—, on avocado in U.S.A., 707.

—, on barley in France, 570; in U.S.A., 503.

—, on bean in England, 730; in U.S.A., 207.

(?) —, on beet in Europe, 548.

—, on cacao in the Philippines, 567.

—, on celery, factors affecting, 142; occurrence in U.S.A., 142, 148, 418, 737; varietal resistance, 142, 498.

—, on cereals in Germany, 351.

—, on chilli in India, 80.

[*Fusarium*] on cotton in the Sudan, 756; in Uganda, 358; in U.S.A., 629.

—, on cucumber in Trinidad, 182.

—, on flax in U.S.A., 363.

—, on groundnut in Uganda, 82.

—, on lupin in Germany and New Zealand, 109.

—, on maize in Kenya, 431.

—, on muskmelon in U.S.A., 812.

—, on oats in France, 571.

—, on oil palm in Malaya, 31.

—, on orange in Italy, 692.

—, on pea in England, 423, 730; in U.S.A., 219.

—, on pine in U.S.S.R., 68.

—, on pineapple in Hawaii, 455, 456.

—, on potato, legislation against, in Sweden, 672; occurrence in New Zealand, 466; in Sweden, 672.

—, on rice in U.S.A., 221.

—, on rye in U.S.S.R., 297.

—, on spruce in Switzerland, 728; in U.S.S.R., 68.

—, on strawberry in U.S.A., 682.

—, on sugar-cane in U.S.A., 657.

—, on sweet potato in Japan, 254; in U.S.A., 118.

—, on timber in U.S.S.R., 270.

—, on turf in Holland, 240.

—, on watermelon in U.S.S.R., 343.

—, on wheat, control, 157; effect of, on yield, 748; factors affecting, 157, 297; note on, 748; occurrence in Canada, 748; in France, 570; in Germany, 157; in U.S.S.R., 225, 297; study on, 297; varietal resistance to, 225.

—, taxonomy of, 334, 709.

—, *acridiorum*, see *F. solani*.

—, *albedinis* on the date palm in Algeria, 303; in French Morocco, 302.

—, *annuum* on chilli in U.S.A., 7.

—, *anthophilum*, see *F. moniliforme* var. *anthophilum*.

—, *apii* and its var. *pallidum* on celery, 419.

—, *avenaceum*, *F. herbarum* referred to, 709.

—, on cereals in France, 571.

(?) —, on *Kalanchoë blossfeldiana* in Germany, 637.

—, on peach in Italy, 454.

—, on peas in Central Europe, 613.

—, on rice in Japan, 653.

—, on tulip in England, 366.

—, *batatas*, see *F. bulbigenum* var. *batatas*.

—, *bulbigenum* on narcissus in England, 366.

—, f. 1, see *F. bulbigenum* var. *lycopersici*.

—, var. *batatas* on sweet potato in U.S.A., 150.

—, var. *blasticola* on saffron in Japan, 256.

—, —, —, on spruce in Switzerland, 482, 728.

—, var. *lycopersici*, antagonism of *Aspergillus niger* to, 387.

—, —, —, on tomato, metabolism of, 310; occurrence in Fiji, 337; in U.S.A., 151, 498; varietal resistance to, 498.

[*Fusarium bulbigenum*] var. *niveum*, dissociation of, in soil, 420.  
 — — —, effect of, on the transpiration of soy-bean, 547.  
 — — — on melon in U.S.A., 419.  
 — — — on watermelon, breeding against, 216, 220; control, 344; factors affecting, 86; note on, 349; occurrence in Japan, 143; in Queensland, 216; in S. Africa, 426; in U.S.A., 86, 220, 349; in U.S.S.R., 343; study on, 143; varietal resistance to, 216, 220, 426.  
 — var. *tracheiphilum* on cowpea, genetics of resistance to, 208; in U.S.A., 208.  
 — *cactacearum* on *Thelocactus nidulans* in Italy, 765.  
 — *cacti maxonii* on *Cactus maxonii* in Italy, 765.  
 — *campoteras* on *Pennisetum typhoides* in India, 472.  
 — *coeruleum* on paper in France, 697.  
 — var. *cellulosae* on paper in France, 584.  
 — *coffeicola* as the conidial stage of *Nectria coffeigena*, 31.  
 — *conglutinans*, antagonism of *Aspergillus niger* to, 387.  
 — on cabbage, histological study on, 732; note on, 206; occurrence in Cuba, 206; in U.S.A., 485, 732; varietal resistance to, 485, 732.  
 — var. *betae* on beet in Belgium and Holland, 549.  
 — *culmorum* in butter from Australia and New Zealand, 761.  
 — on asparagus in Germany, 735.  
 — on barley in Canada, 688.  
 — on carnation in England, 636.  
 — on cereals, field methods for the study of, 298; occurrence in France, 571.  
 — on maize in Rumania, 215.  
 — on oats in Canada, 688.  
 — on peas in the Argentine, 720; in Central Europe, 613.  
 — on rye in U.S.S.R., 297.  
 — on wheat, control, 688; losses caused by, 622; occurrence in Canada, 688; in New S. Wales, 622; in Rumania, 215; in U.S.S.R., 297.  
 — var. *cereale* on barley in the Argentine, 720.  
 — *decemcellulare* on cacao in the Ivory Coast, 397; *Nectria cacaoicola* the perithecial stage of, 397.  
 (?) — *dianthi* on *Cereus senilis* in Italy, 636.  
 — *dimerum* var. *pusillum* on papaw in Trinidad, 182.  
 — *diversisporum*, note on, 472.  
 — (?) — on orange in Rhodesia, 427.  
 — *equiseti* on cotton in the Sudan, 756.  
 — on peas in the Argentine, 720.  
 — *eumartii*, see *F. solani* var. *eumartii*.  
 — *falcatum*, see *F. equiseti*.  
 — *ferruginosum*, see *F. scirpi* var. *acuminatum*.  
 — *fructigenum*, see *F. lateritium*.  
 — *fuliginosporum* on deodar in Italy, 680.  
 — *graminearum*, see *Gibberella saubinetii*, 503.  
 — *graminum* on cereals in France, 571.  
 — *herbarum*, see *F. avenaceum*.  
 — — var. *avenaceum*, see *F. avenaceum*.  
 — — var. *graminum*, see *F. graminum* and *F. avenaceum*.  
 — *heterosporum* on *Spartina* in the Argentine, 720.  
 — var. *loli*, see *F. heterosporum*.  
 — *hyperoxysporum*, see *F. oxysporum* f. 1.  
 — *incarnatum*, see *F. semitectum* var. *majus*.  
 — *lateritium*, action of, on *Corticium solani*, 188.  
 — — on apple in England, 40.  
 — — on orange in Cyprus, 83.  
 — — on rice in Japan, 653.  
 — — some varieties of, no longer maintained, 709.  
 — var. *fructigenum*, see *F. lateritium*.  
 (?) — var. *longum* on coffee in Nyasaland, 561.  
 — (?) var. *majus* on orange in Rhodesia, 427.  
 — *lini*, *F. apii* and *F. apii* var. *pallidum* differentiated from, 419.  
 — — on flax, control, 763; factors affecting, 310, 634; occurrence in the Argentine, 720; in Germany, 763; in Japan, 634; in Switzerland, 310; in U.S.A., 362; study on, 310, 362; varietal resistance to, 310, 362, 634.  
 — — on *Prunus padus* and *Pyrus aucuparia* in Switzerland, 310.  
 — *lycopersici*, see *F. bulbigenum* var. *lycopersici*.  
 — *martii* var. *phaseoli*, see *F. solani* var. *martii* f. 3.  
 — var. *pisi*, see *F. solani* var. *martii* f. 2.  
 — var. *viride*, see *F. solani* var. *martii* f. 1.  
 — *merismoides* on rice in Japan, 653.  
 — — physiology of, 123.  
 — var. *majus*, see *F. merismoides*.  
 — *moniliforme* conidial stage of *Gibberella fujikuroi*, 254, 709.  
 — —, see *Gibberella moniliformis*.  
 — var. *anthophilum* on cucumber in Trinidad, 182.  
 — — — on *Scabiosa succisa* in France, 699.  
 — var. *erumpens* merged in *F. moniliforme*, 709.  
 (?) — — — on orange in Rhodesia, 427.  
 — var. *majus* merged in *F. moniliforme*, 709.  
 — — — on citrus in Sierra Leone, 428.  
 — — — on rice in India, 80, 254.  
 — var. *subglutinans*, see *Gibberella fujikuroi* var. *subglutinans*.  
 — *moronei*, see *F. scirpi* var. *caudatum*.  
 — *nivale*, see *Calonectria graminicola*.  
 — *niveum*, see *F. bulbigenum* var. *niveum*.  
 — *orthoceras* on orange in Rhodesia, 427.  
 — — on potato in New Zealand, 466.  
 — — on strawberry in England, 180.  
 — var. *pisi* on peas in U.S.A., 71, 148.  
 — *oxysporum* on orange in Rhodesia, 427.

[*Fusarium oxysporum*] on sweet potato in U.S.A., 118, 528.  
 —— on yams in Nigeria, 217.  
 —— f. 1 on sweet potato in U.S.A., 150.  
 —— forms 3 and 4 referred to *F. oxysporum* var. *cubense*, 709.  
 —— f. 6 on China aster in Germany, 447.  
 —— f. 8 on peas in Germany and Italy, 613; in U.S.A., 486; near wilt and St. John's disease attributed to, 486, 613.  
 —— var. *aurantiacum* on peas in U.S.A., 72.  
 —— —— on *Cyclamen persicum* in Germany, 585.  
 —— var. *cubense*, *F. oxysporum* forms 3 and 4 referred to, 709.  
 —— —— on banana, control, 13, 113, 378, 643; factors affecting, 378; legislation, against, in Jamaica, 113, 815; notes on, 323, 397; occurrence (?) in British Guiana, 155; in Costa Rica and Honduras, 378; in Jamaica, 113, 378, 426, 643; in Malaya, 81; in Panama, 378; in Trinidad, 13, 181; in Venezuela, 397; possible early record of, 155; viability of, 378.  
 —— var. *nicotianae* on tobacco in French Indo-China, 126; in U.S.A., 85.  
 —— *poae* on carnation in Germany, 512.  
 —— —— on peach in Italy, 454.  
 —— —— on *Poa pratensis* and other grasses in Germany, 512.  
 —— —— on wheat in the Argentine, 720.  
 —— *redolens* on peas in Central Europe and Germany, 613; in U.S.A., 72.  
 —— —— on conifers in Canada, 409.  
 —— var. *solani*, see *F. redolens*.  
 —— *roseum* on cotton in U.S.A., 629.  
 —— *rubiginosum*, see *F. culmorum*.  
 —— *sambucinum* f. 5 on conifers in Canada, 409.  
 —— *scirpi* var. *acuminatum* on conifers in Canada, 409.  
 —— var. *caudatum* can infect tomato, 405.  
 —— —— on chilli in the Argentine, 720.  
 —— —— on cotton in the Sudan, 756.  
 —— —— on *Hibiscus esculentus* in the Sudan, 756.  
 —— *semitectum* on lime in India, 472; saltation in, 472.  
 —— var. *majus*, note on, 472.  
 —— *solani* can infect apple, 472.  
 —— —— on conifers in Canada, 409.  
 —— —— on cotton in the Sudan, 756.  
 —— —— on *Cyclamen persicum* in Germany, 585.  
 —— —— on lime in India, 472; saltation in, 472.  
 —— —— on locusts in S. Africa, 99.  
 —— —— on orange in Rhodesia, 427.  
 —— —— on potato in India, 472.  
 —— var. *eumartii*, effect of temperature and ultra-violet rays on, 386, 521.  
 —— —— —— on potato, 334.  
 —— var. *martii* on bean in England, 730; in U.S.A., 334.  
 —— —— —— on mushrooms in England, 346, 615.

[*Fusarium solani* var. *martii*] f. 1 on flax in U.S.A., 363.  
 —— —— —— f. 2 on peas, *F. martii* var. *pisi* synonymous with, 334; *F. solani* var. *striatum* considered identical with, 613; occurrence in Europe, 613; in Holland, 613; study on, 334.  
 —— —— —— f. 3 on beans, *F. martii* var. *phaseoli* synonymous with, 334.  
 —— —— var. *medium*, see *F. solani*.  
 —— —— var. *minus* on rye and wheat in U.S.S.R., 297.  
 —— —— var. *striatum*, *F. solani* var. *martii* f. 2 considered identical with, 613.  
 —— *subpallidum*, see *F. sambucinum* f. 5.  
 —— *subulatum*, see *F. avenaceum*.  
 —— *succisae* (Schr.) Sacc., see *F. moniliiforme* var. *anthophilum*.  
 —— *tracheiphilum*, see *F. bulbigenum* var. *tracheiphilum*.  
 —— *tubercolarioides*, see *F. avenaceum*.  
 —— *vasinfectum* on cotton, control, 359, 629; factors affecting, 359; nature of resistance to, 221; occurrence (?) in the Belgian Congo, 224; in India, 358, 359; (?) in Uganda, 82; in U.S.A., 221, 629; studies on, 359.  
 —— —— on *Crotalaria juncea* in India, 144; varietal resistance to, 560.  
 —— —— on pigeon pea in India, 144.  
 —— —— on sesame in Japan, 8.  
 —— var. *lutulatum* on peas in U.S.A., 72.  
 —— var. *pisi*, see *F. oxysporum* f. 8.  
 —— var. *zonatum* on flax in U.S.A., 363.  
 —— —— —— on onion in U.S.A., 150.  
 —— *viride*, see *F. solani*.  
 —— *zonatum*, see *F. vasinfectum* var. *zonatum*.  

*Fusco-Fomes*, a section of the genus *Fomes*, 795.

*Fusicladium dendriticum* var. *eriobotryae* on loquat in Italy, 777.

*Fusicoccum noxiun*, see *Dothidea noxia*.

*Fusidomus*, note on, 194.

*Fusisporum album*, *Articulariella aurantiaca* synonym of, 408.

G. 33, use of, against *Plasmopara viticola* on vine, 79.

*Gaillardia*, tomato spotted wilt can infect, 404.

*Galanthus*, *Stagonospora curtisii* can infect, 448.

*Galleria mellonella*, *Beauveria bassiana* and *Metarrhizium anisopliae* on, in France, 629.

Gallin acid, production of, by moulds, 52.

*Ganoderma applanatum* on *Acacia confusa*, *Albizia lebbek*, bamboo, grapefruit, orange, mango, and *Melia azedarach* in Japan, 532.  
 —— —— on oil palm in W. Africa, 578.  
 —— —— on *Prunus mume* in Japan, 532.  
 —— —— on walnut in U.S.S.R., 62.  
 —— ——, secondary spore formation in, 611.  
 —— *lucidum* on *Acacia confusa* and *Albizia lebbek* in Japan, 532.  
 —— —— on coco-nut in India, 693.  
 —— —— on oil palm in W. Africa, 578.

[*Ganoderma lucidum*] on *Poinciana regia* in Japan, 532.

—, secondary spore formation in, 611.

— *pseudoferreum* on *Hevea* rubber in Malaya, 790.

— *rugosum* on *Acacia confusa* in Japan, 532; *Polyporus rugosus* synonym of, 532.

*Garcinia mangostana*, see Mangosteen.

*Gardenia*, *Phomopsis* on, in U.S.A., 107.

— *angusta* var. *ovalifolia*, *Corticium kolerga*, *C. sasakii*, and *C. stevensii* can infect, 796.

*Genistella* and *G. ramosa*, note on, 630.

*Geomyces* on potato in Canada, 760.

*Geotrichoides*, referred to *Proteomyces*, 170; to *Trichosporon*, 170.

—, use of, in control of wood-pulp fungi, 275.

— *krusei*, see *Candida krusei*.

*Geotrichum candidum* in Italian and other leavens, 383.

—, use of, in control of wood-pulp fungi, 275.

— var. *parasiticum* can infect tomato, 405.

— *immitis* considered a strain of *Coccidioides immitis*, 445.

— *javanense* in yoghourt in Java, 328.

— *louisianae* considered a strain of *Coccidioides immitis*, 445.

— *roseum*, affinity between *Corticium fuciforme* and, 588.

*Geranium*, celery virus 1 on, in U.S.A., 615.

— *carolinianum*, celery virus 1 on, in U.S.A., 615.

— *dissectum*, *Sclerotinia trifoliorum* on, in Sweden, 315.

*Germannit*, use of, against reclamation disease of cereal and other crops, 575.

*Germisan*, action of, in hot water seed treatment, 296.

—, effect of, on metals and vice versa, 597.

—, manufacture of, in U.S.S.R., 47.

—, use of, against *Calonectria graminicola* on rye, 20; against *Corticium solani* on beet, 809; against *Helminthosporium gramineum* on barley, 20, 21; against *H. sativum* on barley, 299; against *Phoma betae* on beet, 809; against *Pythium de Baryanum* on beet, 809; against *Ustilago avenae* on oats, 20, 21; against vegetable diseases, 277; against wheat bunt, 20, 21.

*Gibberella*, *Cyanochyta* and *Cyanophomella* pycnidial stages of, 194.

— on coffee in the Cameroons, 32.

—, *Stagonostroma* pycnidial stage of, 194.

— *fujikuroi*, *Fusarium moniliforme* [= *F. moniliforme* var. *majus*] the conidial stage of, 254, 709.

—, *G. moniliformis* synonym of, 709.

— on rice, control, 120; occurrence in Japan, 254, 653; (?) in the Philippines, 120; overwintering of, 653; studies on, 120, 254; varietal resistance to, 120.

— var. *subglutinans* on citrus in Sierra Leone, 428.

[*Gibberella fujikuroi* var. *subglutinans*] (?) on maize in Kenya, 427.

— — — on wheat in the Argentine, 15.

— *moniliformis*, antagonism of *Aspergillus niger* to, 387.

— — can infect apple, 242, 472.

— — on cotton in the Sudan, 756; in U.S.A., 629.

— — on maize, control, 232; occurrence in the Argentine, 720; in U.S.A., 232, 437; in U.S.S.R., 297, 493; study on, 437; *Ustilago zae* in relation to, 437.

— — on rice in British Guiana and India, 217; (?) in the Philippines, 120.

— — on rye in U.S.S.R., 297.

— — on sorghum in India, 472.

— — on spruce in Switzerland, 482, 728.

— — on sugar-cane, factors affecting, 58; note on, 80; occurrence in India, 80; in Java, 58, 153, 743; in Mauritius, 84; study on, 58; varietal susceptibility to, 84.

— — on wheat in U.S.S.R., 297.

— —, see also *G. fujikuroi*.

— *savubinetii*, antagonism of bacteria and moulds to, 387.

— — on barley, control, 503; feeding experiments with, 231, 434; note on, 149; occurrence in Japan, 296; in U.S.A., 149, 231, 503, 749; physiologic forms of, 297; variation in, 297, 749.

— — on *Bromus inermis* in Canada, 623.

— — on *Eleusine coracana* in Uganda, 82.

— — on maize, control, 232, 355, 751; factors affecting, 355, 690; losses caused by, 437; occurrence in U.S.A., 232, 437, 690, 749, 751; seed-coat injury in relation to, 355; *Ustilago zae* in relation to, 437; variation in, 749.

— — on onion, toxicity of phenolic compounds to, 553.

— — on rice in Japan, 653.

— — on wheat in the Argentine, 720; in Belgium, 679; in Japan, 296; physiologic specialization of, 296; variation in pathogenicity of, 297.

*Gibellina cerealis* can infect barley, 26.

— — on oats (?) in U.S.A., 26.

— — on wheat in Hungary and Italy, 26; (?) in U.S.A., 26.

‘*Gilah*’ of tobacco in Sumatra, 473.

*Gilchristia dermatitidis*, synonymy of, 99, 100, 582. (See also *Endomyces dermatitidis*.)

*Ginger* (*Zingiber officinale*), *Pythium* (?) *butleri* on, in Ceylon, 146.

*Ginseng* (*Panax quinquefolium*), *Ranunculus*, *R. mors-panaci*, *R. panaxicola*, and *R. robusta* on, in Canada, 393.

*Gladiolus*, *Bacterium marginatum* on, in U.S.A., 173, 498.

— mosaic in Brazil, 634.

—, *Penicillium gladioli* on, in U.S.A., 173.

—, *Septoria gladioli* on, in Cyprus, 193; *Ascochyta*-like forms of, 193.

*Gleditschia triacanthos*, mottling of, in Bulgaria, 462.

*Genospora gammeli* synonym of *Endomyces dermatitidis*, 100.

— *meteuropaea*, see *Coccidioides immitis* var. *meteuropaea*.

*Gliocladium* in butter, 761.  
 — in soil, 392.  
 — on man in Costa Rica, 169.  
 — *roseum* in soil, 392.  
*Globus* seed disinfection apparatus, 519.  
*Gloeodes pomigena* on apple in S. Africa, 452.  
 — — on mango in S. Africa, 426.  
 — — on orange in S. Africa, 754.  
*Gloeosporium* on cacao in the Philippines, 567.  
 — on papaw in Queensland, 216; in Trinidad, 182.  
 — on *Pholidota imbricata* in U.S.A., 587.  
 — on rhododendron in Germany, 173.  
 — *albuni* on apple in England, 771.  
 — *ampelophagum* on vine, control, 315, 617, 814; factors affecting, 814; *Mangina ampelina* pycnidial form of, 617; occurrence in Germany, 557; in Italy, 616; in Venezuela, 397; in Victoria, 814; in Western Australia, 315; study on, 616; varietal susceptibility to, 814.  
 — *amygdalinum* on almond in Italy, 680.  
 — *apocryptum* on maple in U.S.A., 203.  
 — *epicarpii* on walnut in Germany, 204.  
 — *fructigenum*, see *Glomerella cingulata*.  
 — *linetticolum* on lime in St. Lucia, 84.  
 — (?) — on orange in Ceylon, 146.  
 — *musarum* on banana in Australia, 517; in Sierra Leone, 427.  
 — *nervisequum* on *Platanus occidentalis* in the Argentine, 15.  
 — *olivarum* can infect apple, 596.  
 — — on olive in Japan, 596.  
 — *piperatum*, see *Glomerella cingulata*.  
 — *ribis* on currant in France, 377.  
*Glomerella cingulata*, antagonism of bacteria and moulds to, 387.  
 — can infect cherry, 40; olive, 596; orange, peach, pear, and quince, 40.  
 — —, comparison of, with *Gloeosporium olivarum*, 596.  
 — — on almond in Tunis, 429.  
 — — on apple in the Argentine, 40; in U.S.A., 452.  
 — — on chilli in the Argentine, 15; in U.S.A., 344.  
 — — on *Cyclamen persicum* in Germany, 585.  
 — — on mango in transit from India, 518; in U.S.A., 46.  
 — — on *Piper betle* in India, 122.  
 — — on tea in India, 721.  
 — *gossypii* on cotton in the Philippines, 755; in U.S.A., 629.  
 — *lycopersici* on tomato in Germany, 725.  
 — *major* on tea in India, 720; *Colletotrichum* conidial stage of, 720.  
 — *rubicola* can infect apple, 378.  
 — — on raspberry in U.S.A., 378.  
*Gloxinia*, *Phytophthora speciosa* on, in Germany, 637.  
 —, tomato spotted wilt affecting, 404; in England, 107.  
*Glucose polysaccharides*, constituents of fungal tissue, 603.  
*Glycerol*, effect of, on mould growth in textiles, 585.  
*Glycine max*, see Soy-bean.

*Gnomonia leptostyla* on walnut in Germany, 203.  
 — *nerviseada* on pecan in U.S.A., 537; perfect stage of *Leptothyrium nervise-dum*, 537.  
 — *rubi* on rose in England, 313.  
 — *ulmea* on elm in U.S.A., 203.  
 — *veneta* on oak and *Platanus* in U.S.A., 203.  
*Goat*, (?) *Monilia* on the, in Norway, 34.  
 —, poisoning of the, by *Balansia* in India, 630.  
*Godetia*, *Phytophthora parasitica* on, in Rhodesia, 678.  
 —, tomato spotted wilt can infect, 404.  
 — *grandiflora*, aster yellows affecting, in U.S.A., 171.  
*Gonatorrhodiella parasitica* on *Trichoderma lignorum* in U.S.A., 663.  
*Gooseberry* (*Ribes grossularia*), *Byssochlamys fulva* on, in England, 775.  
 —, *Cronartium ribicola* on, eradication against, in U.S.A., 455, 540; legislation against, in U.S.A., 544. (See also *Ribes* eradication.)  
 —, *Mycosphaerella grossulariae* on, in U.S.A., 774.  
 —, *Pseudopeziza ribis* on, in U.S.A., 774; pathogenicity and physiology of, 377.  
*Gossypium*, see Cotton.  
*Gramineae*, method of detecting fungous hyphae in the haulms of, 746.  
 —, 'pupation' disease of, in U.S.S.R., 493.  
 —, see also Grasses, Turf.  
*Granadilla* (*Passiflora macrocarpa*), *Phleospora* or *Septoria* on, in Trinidad, 182.  
*Granosan*, use of, against *Bacterium malva-cearum* on cotton, 221; against *Corticium solani* and *Phoma betae* on beet, 809; against *Pythium de Baryanum* on beet, 809; against rice diseases, 222.  
*Grapefruit* (*Citrus decumana*, *C. grandis*, *C. maxima*), *Botryodiplodia theobromae* and *Botryosphaeria ribis* on, in Trinidad, 754.  
 —, brown markings on, from Portuguese E. Africa, 754; in S. Africa, 754.  
 —, chlorosis in Palestine, 753.  
 —, *Colletotrichum gloeosporioides* on, in Trinidad, 183, 754.  
 —, *Corticium salmonicolor* and *C. stenensis* on, in Trinidad, 627.  
 —, *Diaporthe* can infect, 96.  
 —, — *citri*, control, 161; occurrence in New S. Wales, 161; in Trinidad, 182, 754; in U.S.A., 564.  
 —, *Diplodia* can infect, 564.  
 —, — *natalensis* on, in U.S.A., 564.  
 —, frenching in U.S.A., 441.  
 —, *Ganoderma applanatum* on, in Japan, 532.  
 —, gummosis of, in Trinidad, 505, 627.  
 —, low temperature breakdown of, in England, 754.  
 —, 'mal di gomma' of, in Venezuela, 398.  
 —, Marasmoid fungi on, in Trinidad, 627.  
 —, *Penicillium digitatum* and *P. italicum* on, in Trinidad, 182, 754.

[Grapefruit], *Phytophthora palmivora* and *P. parasitica* on, in Trinidad, 505, 627; not affecting stored fruit, 754.

—, *Rhizoctonia lamellifera* on, in S. Rhodesia, 233.

—, root rot in Trinidad, 627.

—, *Septobasidium alni* on, in Venezuela, 398.

—, (?) *pseudopedicillatum* on, in Trinidad, 627.

—, (?) *Sphaceloma fawcettii* on, see *Sporotrichum citri* on.

—, *Sporotrichum citri* on, control, 162, 627; occurrence in New S. Wales, 162; in Sierra Leone, 428; in Trinidad, 627; (?) in U.S.A., 348.

Grapes, see Vine.

*Graphiopsis*, some *Graphium* spp. transferred to, 703.

*Graphium*, reclassification of the genus, 703.

— stage of *Ceratostomella ips*, 138; of *C. piceae*, 804; of *C. ulmi*, 406.

— *pirinum* imperfect stage of *Ophiostoma catonianum*, 702.

— *rigidum* on timber in U.S.A., 729.

Grasses, *Asterocystis radicis* on, in Holland, 12.

—, *Corticium solani* on, in S. Africa, 426.

—, diseases of, in U.S.A., 744.

—, *Helminthosporium* on, in S. Africa, 426.

—, *sativum* on, in Canada, 623.

—, *Ligniera* on, in Holland, 12.

—, *Mucilago spongiosa* on, in Germany, 766.

—, *Ophiobolus graminis* on, in Canada, 622; in Holland, 12.

—, *Puccinia agropyri* can infect, 501.

—, *rubigo-vera* on, in U.S.A., 746.

—, *tomipara* on, in U.S.A., 746; not a synonym of *P. rubigo-vera*, 746.

—, *Pythium arrhenomanes* on, in Canada, 494.

—, *de Baryanum* on, in Holland, 259.

—, *Rhizoctonia* on, in Holland, 12; in S. Africa, 426.

—, *Sclerospora graminicola* on, in Holland, 12.

—, *Sclerotium rhizodes* on, in Germany, 766.

—, white spotting of, in Germany, 572.

—, *Wojnowicia graminis* can infect, 425.

—, see also Hay, Turf, Gramineae.

Grasshoppers, *Empusagryllion* in Canada, 579; in U.S.A., 497.

Green spot of pineapple, (?) bacterial symbiont of *Pseudococcus brevipes* in relation to, in Hawaii, 379.

*Grevillea robusta*, (?) *Stilbum* on, in Tanganyika, 13, 678.

Grey speck of oats, control, 29, 121, 122, 393, 575, 677; factors affecting, 121, 256, 393; occurrence in Denmark, 121, 393; in England, 677; in Germany, 575; in Holland, 29; in Western Australia, 122; study on, 121, 393; varietal resistance to, 575.

— of wheat in Western Australia, 122.

— stripe of narcissus in England, 366.

*Grosmmania penicillata*, *Ceratostomella penicillata* referred to, 703; *Scopularia penicillata* form of, 703.

Groundnut (*Arachis hypogaea*), *Bacterium solanacearum* on, in Sumatra, 153.

—, *Cercospora arachidicola* on, in Uganda, 82.

—, — *personata* on, in Brazil, 212.

—, *Cercosporaella cylindrospora* on, in France, 213.

—, *Corticium* on, 212.

—, *Fusarium* on, in Uganda, 82.

—, *Macrophomina phaseoli* on, in Uganda, 82.

— moulds, 213.

—, *Puccinia arachidis* on, 212.

—, *Rhizoctonia* on, 212.

—, *Rhizopus nigricans* on, in Rhodesia, 678.

— rosette in Sierra Leone, 739; transmission of, by *Aphis laburni*, 739.

—, *Sclerotium omnivorum* on, in Rumania, 215.

—, — *rolfssii* on, 212; in the Philippines, 315; in Uganda, 82.

Guava (*Psidium guajava*) *Cercospora sawadae* on, in Japan, 472; *C. psidii* Sawada synonym of, 472.

—, woody gall of, (?) *Phycomycete* causing, in Brazil, 778.

*Guignardia aesculi* on chestnut in U.S.A., 203.

— *bidwellii* on vine, control, 10; note on, 10; occurrence in Brazil, 87; in the Caucasus, France, Germany, 557; in Italy (denied), 557; in Jugo-Slavia, 491; in Spain, 557; in U.S.A., 10.

Gum arabic, effect of, on soil microflora, 392.

Gummiosis of apricot in S. Australia, 559.

— of coco-nut (? physiological) in Java, 152.

— of grapefruit in Trinidad 505, 627.

*Gymnoconia interstitialis* on blackberry in U.S.A., 642.

— on raspberry in U.S.A., 181, 642.

— on *Rubus canadensis* in U.S.A., 643.

*Gymnosporangium clavariaeforme* on *Juniperus rigida* in Japan, 533.

— *globosum* on *Amelanchier*, *A. alnifolia*, *A. canadensis*, apple, *Crataegus*, *Crataegomespilus*, *Cydonia oblonga*, *Juniperus scopulorum*, *J. virginiana*, *Mespilus*, *Pyrus*, quince, *Sorbaronia*, *Sorbopyrus*, and *Sorbus* in U.S.A., 368.

— *haraeanum* on *Juniperus chinensis* and *Pyrus sinensis* var. *culta* in Japan, 533.

— *juniperi-virginianae* on apple, control, 684; occurrence in U.S.A., 150, 684, 771; study on, 369; varietal resistance to, 150, 369, 771.

— on *Juniperus chinensis* and *J. communis*, resistance to, 150.

— on *Juniperus scopulorum* in U.S.A., 150.

— on *Juniperus virginiana* in U.S.A., 150, 349.

— *yamadae* on *Juniperus chinensis* in Japan, 533.

*Gypsophila paniculata*, *Phytophthora* on, in U.S.A., 147.

H 146 neu, use of, against wood-pulp fungi, 275.  
*Hainesia lythri* on strawberry in England, 180.  
 'Hajkol' dust, use of, against wheat bunt, 90, 228.  
*Hansenula anomala* can infect tomato, 405.  
*Haplographium penicilloides* on wood-pulp in Sweden, 275.  
*Haplosphaeria deformans* on loganberry in Canada, 495.  
*Harpella* and the Harpellaceae, morphology of, 630.  
 Havretillantin dust, use of, against *Ustilago avenae* on oats, 21.  
 Hay, *Alternaria humicola*, *Aspergillus clavatus*, *A. flavus*, *A. fumigatus*, *A. niger*, *A. terreus*, *Cunninghamella elegans*, *Hormodendrum nigrescens*, *Mucor abundans*, *Penicillium humicola*, *P. oxalicum*, *Rhizopus nigricans*, *R. tritici*, and *Spicaria divaricata* on, in U.S.A., 249.  
 Hazel nut, see *Corylus avellana*.  
 'Healthy potato virus', see Potato, 'healthy potato virus' of.  
 Heart rot of beet, see Dry and heart rot of beet.  
 Heat crinkle of apple and plum in Australia, 520.  
 — treatment in control of peach yellows, rosette, and phony peach, 374.  
 Hedrinol, use of, against reclamation disease of cereal and other crops, 575.  
*Helianthus annuus*, see Sunflower.  
*Helichrysum bracteatum*, *Sclerotium rolfsii* on, in the Philippines, 314.  
*Helicobasidium compactum* on pine in S. Africa, 426.  
 — *purpureum* can infect beet, carrot, mangold, parsnip, and potato, 730.  
 — on asparagus in England, 730.  
 — — on beet in Europe, 548.  
*Helicosporium* in the Arctic atmosphere, 481.  
 Helion, use of, against *Venturia inaequalis* on apple and *V. pirina* on pear, 590.  
 Heliones, see Dyes, aniline.  
*Helminthosporium* on avocado in U.S.A., 707.  
 — on barley in U.S.A., 503.  
 — on cereals in U.S.S.R., 291; method of determining losses caused by, 291.  
 — on *Pennisetum purpureum* in Trinidad, 13.  
 — on sugar-cane in Uganda, 793.  
 — on turf in Holland, 240; in S. Afr., 426.  
 — *M* on wheat in New S. Wales, 622; referred to *Curvularia ramosa*, 622.  
 — *avenae* on oats in Northern Ireland and Scotland, 558; in U.S.A., 219.  
 — —, *Pyrenophora* ascigerous stage of, 515.  
 — *bataticola* on sweet potato in U.S.S.R., 652.  
 — *bromi*, *Pyrenophora* ascigerous stage of, 125.  
 — *dictyoides* on *Festuca elatior*, *Pyrenophora* ascigerous stage of, 515.  
 [ *Helminthosporium*] *erythrosilium* on *Agrostis alba*, *A. palustris*, and *A. tenuis* in U.S.A., 514.  
 — *giganteum* on *Agrostis palustris* in U.S.A., 515.  
 — *gossypii* on cotton in the Philippines, 755.  
 — *gramineum*, method of detecting hyphae of, in host tissues, 746.  
 — — on barley, control, 20, 21, 27, 28, 159, 380; cytological study on, 433; occurrence in Canada, 353; in Denmark, 27; in Germany, 20, 27, 159, 299, 353; in Sweden, 21; in U.S.A., 353; *Pyrenophora trichostoma* ascigerous stage of, 299; specialization and variation in, 353; studies on, 27, 433; varietal susceptibility to, 28, 353.  
 — — on *Hordeum spontaneum* and *H. zeocriton* in Germany, 28.  
 — *leucostylum* can infect maize, *Panicum frumentaceum*, *Pennisetum typhoideum*, and sorghum, 440.  
 — — on *Eleusine coracana* in India, 161, 440.  
 — *nodulosum* can infect maize, *Panicum frumentaceum*, *Pennisetum typhoideum*, sorghum, and sugar-cane, 440.  
 — — on *Eleusine aegyptiaca* in India, 440.  
 — — on *Eleusine coracana* in India, 161, 440.  
 — *ocellum* on sugar-cane, breeding against, 57; factors affecting, 57, 564; occurrence in Japan, 396; in U.S.A., 57, 257, 564; referred to *H. stenopilum*, 531; relation of *Leptosphaeria sacchari* and *Phyllosticta sorghina* to, 57; study on, 57; varietal susceptibility to, 58, 257.  
 — — on sugar-cane and sorghum hybrids in U.S.A., 258.  
 — *oryzae*, see *Ophiobolus miyabeanus*.  
 — *papulosum* on apple in U.S.A., 349, 372; wrongly ascribed to *Clasterosporium*, 372.  
 — — on pear in U.S.A., 372.  
 — *sacchari* on sugar-cane in Hawaii, 530; (?) in India, 80.  
 — *sativum*, antagonism of bacteria and moulds to, 387; of *Ophiobolus graminis* to, 689; of *Trichothecium roseum* to, 569.  
 — — on *Agropyron cristatum*, *A. repens*, and *A. tenerum* in Canada, 623.  
 — — on barley, control, 80, 299, 503, 688; notes on, 299; occurrence in Burma, 286; in Canada, 688; (?) in Germany, 159, 299; in India, 80; in U.S.A., 503; varietal susceptibility to, 80.  
 — — on *Bromus inermis* in Canada, 623.  
 — — on cereals, field experimentation on, 298.  
 — — on grasses in Canada, 623.  
 — — on oats in Canada, 298, 688.  
 — — on wheat, control, 222, 688; effect of, on germination, 623; on yield, 748; losses caused by, 622; notes on, 298, 748; occurrence in Burma, 286; in Canada, 298, 569, 688, 748; in India, 91; in New S. Wales, 622, 623; in U.S.A., 222; physiologic specialization in, 622.

[*Helminthosporium*] *siccans* can infect *Lolium multiflorum* and *L. perenne*, 515; *Pyrenophora* ascigerous stage of, 515.

— *sigmoideum* conidial stage of *Leptosphaeria salvinii*, 119.

— *stenosporum* on sugar-cane, control, 530; occurrence in Hawaii, 530; in Japan, 396, 531; in U.S.A., 257; wrongly referred to *H. ocellum*, 531; varietal susceptibility to, 257.

— — on sugar-cane  $\times$  sorghum hybrids in U.S.A., 258.

— *teres*, see *Pyrenophora teres*.

— *tetramera* on wheat in New S. Wales, 622; identified as *Curvularia spicifera*, 622.

— *tomato* renamed *Brachysporium tomato*, 344.

— *torulosum* on banana in the Philippines, 312, 323; in Sierra Leone, 427.

— — on *Musa textilis* in the Philippines, 312.

— *triseptatum* on *Agrostis alba* in U.S.A., 514.

— *tritici-repentis* on *Agropyron repens* in India, 90.

— — — on wheat in India, 90; *Pyrenophora* ascigerous stage of, 91.

— *turicum* on maize in Kenya, 431; in Madagascar, 685.

*Helopeltis bergrothi* causing canker on avocado in Nyasaland, 561; on mango in Nyasaland, 14, 561.

*Helostroma album*, *Articulariella aurantiaca* synonym of, 408.

*Hemicelluloses*, decomposition of, by bacteria and fungi, 55.

*Hemileia coffeicola* on coffee in the Cameroons, 31, 303; *Uredo coffeicola* a stage of, 303; wrongly attributed to *H. vastatrix*, 303.

— *vastatrix* on coffee in India, 164; in Madagascar, 685.

— —, *Uredo gardeniae thunbergiae* separated from, 304.

*Hemispora*, reference to *Sporendonema* not accepted, 583.

— *coremiformis* on man in Costa Rica, 583.

— *stellata* on man in Costa Rica, 169.

*Hemp* (*Cannabis sativa*), *Cercospora* on, in India, 80.

*Hendersonia graminis*, probably a strain of *Wojnowicia graminis*, 569.

— *herpotricha* on wheat in Sweden, 352.

— —, probably a strain of *Wojnowicia graminis*, 569.

— —, pycnidial stage of *Ophiobolus herpotrichus*, 569.

— —, see also *Ophiobolus herpotrichus*.

— *secalina*, probably a strain of *Wojnowicia graminis*, 569.

*Hendersonula toruloidea* on fig in Cyprus, 83.

— — on lemon, poplar, and walnut in Cyprus, 83; *Torula* form of, 83.

‘Hereditary Eisenfleckigkeit’ of potato synonym of potato ‘pseudo-net necrosis’, 253.

Herzog dusting apparatus, 716.

*Heteranthera dubia*, *Sorodiscus heterantherae* on, in N. America, 719; may be identical with *Membranosorus heterantherae*, 720.

*Heterodera marioni* in relation to pineapple wilt in Queensland, 457.

— — on cowpea in Egypt, 614; in U.S.A., 208.

— *schachtii*, *Olpidium nematodae* on, in Czechoslovakia, 33.

— — on *Protomyces* in Czechoslovakia, 33.

— —, *Torula heteroderae* on, in Czechoslovakia, 33; referred to *Trichosporum populneum*, 33.

*Heterosporium* on *Allium schoenoprasum* in England, 423.

— *avenae* on oats in the Argentine, 15.

— *gravei* on iris, conidial stage of *Didymella macrospora*, 448; control, 696; occurrence in England, 698; in Italy, 448; in U.S.A., 586; saltation in, 448.

*Hevea brasiliensis*, see Rubber.

Hexyl resorcinol, toxicity of, to dermatophytes, 105; to moulds in pharmaceutical preparations, 115.

*Hibiscus esculentus*, (?) *Erysiphe cichoracearum* on, in Sierra Leone, 428.

— —, *Fusarium scirpi* var. *caudatum* on, in the Sudan, 756.

— —, *Macrospomina phaseoli* on, in Cyprus, 83.

— *saddariffa*, *Diplodia hibiscina* var. *saddariffae* on in India, 470.

— —, *Fusarium* on, in Java, 397; perithecial stage of *Calonectria rigidiuscula*, 397.

— —, *Sclerotinia sclerotiorum* on, in India, 106.

Hickory (*Carya*), *Mycelium radicis nigrostrigatum* on, forming mycorrhiza, in Sweden, 187.

—, *Nectria galligena* on, in U.S.A., 407.

Higosan, use of, against *Bacterium tumefaciens* on fruit trees, 499.

*Hippeastrum calceolaria*, tomato spotted wilt affecting, in England, 662.

— *vittatum*  $\times$  *Narcissus*, *Stagonospora curtisi* on, in U.S.A., 448.

*Hirsutella*, *Sclerotrichum columnare* on, in the West Indies, 443.

— *entomophila* and *H. versicolor*, *Patellina epimycetes* on, 443.

— *formicarum* conidial stage of *Ophiocordyceps unilateralis*, 443.

— *radiata* on flies in British Guiana, 443.

*Histoplasma capsulatum*, see *Posadasia capsulata*.

— *farcinimosum*, *Cryptococcus farcinimosus* renamed, 235, 446; not accepted, 583.

— *muris*, *Cryptococcus muris* renamed, 235; not accepted, 583.

— *pyriformis*, see *Posadasia pyriformis*.

Histoplasmaceae, a family of the asporogenous yeasts, 235.

*Holcus mollis*, *Corticium fuciforme* on, in Great Britain, 587.

Holly (*Ilex*), *Diaporthe* (?) *eres* and *Phomopsis crustosa* on, in U.S.A., 587.

Hollyhock (*Althaea*), *Cercospora althaeina* on, in Japan, 471.

—, *Puccinia malvacearum* on, in U.S.A., 38.

*Hoplolaimus bradyi* in relation to tuber rot of yams in Nigeria, 217.

Hops (*Humulus lupulus*), *Bacterium tumefaciens* can infect, 111.

—, (?) bacterial canker of, in U.S.A., 607.

—, (?) mosaic of, in England, 423.

—, *Pseudoperonospora humuli* on, in England, 792; in U.S.A., 191.

—, *Sclerotinia sclerotiorum* on, in England, 792.

—, split leaf of, in England, 423.

*Hordeum*, *Cercospora herpotrichoides* and *Ophiobolus graminis* can infect, 503.

—, *Puccinia rubigo-vera* on, physiologic specialization in, 746.

—, *euclaston*, *Puccinia glumarum* on, in U.S.A., 27.

—, *murinum*, *Wojnowicia graminis* can infect, 425.

—, *spontaneum*, *Helminthosporium gramineum* on, in Germany, 28.

—, *Puccinia glumarum* on, in U.S.A., 27.

—, *vulgare*, see Barley.

—, *zeocriton*, *Helminthosporium gramineum* on, in Germany, 28.

*Hormodendrum* a stage of *Dibotryon morbosum*, 593, 772.

— in butter in U.S.A., 237.

— in eggs in France, 237.

— on fruit trees in Canada, 44.

— *algeriensis* on man in Algeria, 168, 509.

— *elatum* synonym of *Cladosporium elatum*, 275.

— *langeroni* on man in Costa Rica, 168.

— *nigrescens* in hay in U.S.A., 249.

*Hormonema dematioides* on spruce in U.S.S.R., 68.

— on timber in U.S.S.R., 270; in Victoria, 137.

Horse, *Trichophyton bulbosum* on the, in Sudan, Syria, and Tunis, 103.

—, — *equinum* on the, in Germany, 103.

Horse-radish (*Cochlearia armoracia*), black rot of, in Germany, 419.

—, *Cystopus candidus* on, in Germany, 419.

— mosaic in U.S.A., 731.

— rot in Germany, 677.

—, *Verticillium dahliae* on, in Germany, 419.

Hot-water seed treatment against *Alternaria brassicae* on turnip, 486; against *Bacterium translucens* var. *undulosum* on wheat, 571; against cereal diseases, 431; against *Helminthosporium gramineum* on barley, 27; against *Phoma betae* on beet, 151; against *Phomopsis vexans* on eggplant, 151; against *Sclerotinia graminicola* on *Setaria italica*, 577; against *Ustilago hordei* on barley, 745; against *U. nuda* on barley, 27, 296, 745; against *U. tritici* on wheat, 22, 89, 296, 571, 745; against *Verticillium* on eggplant, 283; against *V. albo-atrum* on eggplant, 684; against wheat bunt, 745.

[Hot-water] treatment of *Mentha* runners against *Puccinia menthae*, 792; of sugar-cane sette against *Bacterium albilineans*, 531; against fourth disease, 530.

*Howea forsteriana*, *Pestalozzia palmarum* on, in Italy, 608.

*Humicola* in soil, 392.

*Humulus lupulus*, see Hops.

Humus, bacteria and fungi in relation to types of, 602.

*Hyalodendron* a form of *Ophiostoma*, 703.

— album, *Cladosporium album* renamed, 70.

— *lignicola*, *H. lignicola* ff. *simplex* and *undulatum* on wood-pulp in Sweden, 69, 70.

— *pirinum* imperfect form of *Ophiostoma catoniianum*, 702.

*Hyalopus* in soil, 392.

*Hydnomyces ochraceum* on walnut in U.S.S.R., 62.

Hydrangea, (?) *Microsphaera polonica* on, in S. Africa, 426.

—, *Oidium* on, in Ceylon, 146.

Hydrochloric acid, use of, with mercuric chloride against *Plasmodiophora brassicae* on cabbage, 278.

Hydrogen-ion concentration in relation to action of Du Bay 738 dust, 146; to *Aspergillus niger*, 691; to *Bacillus ananas* and *Bacterium ananas*, 777; to *Bact. beticola*, 686; to *Bact. solanacearum* on potato, 564; to *Bact. tumefaciens*, 686; to beet curly top virus, 549; to *Cladosporium tropicalis*, 695; to *Cocomyces hiemalis* on cherry, 376; to *Corticium fuciforme*, 587; to *C. solani*, 208; to *Coryneum delleannii*, 113; to cucumber mosaic virus, 143, 659; to cupric fungicides, 422; to dry and heart rot of beet, 282, 552, 808; to filtrability of bacteria, 744; to *Fusarium bulbigenum* var. *blasticola*, 256; to *F. lini* and *F. [bulbigenum var.] lycopersici*, 311; to *F. merisimoides* var. *majus* [*F. merisimoides*], 124; to *F. [vasinfectum var.] zonatum*, 150; to grey speck of oats, 121; to *Helminthosporium gramineum*, 28; to *H. leucostylum* and *H. nodulosum*, 161; to *Lambertella corni-maris*, 451; to *Macrohomina phaseoli* on cotton, 360; to *Moniliopsis aderholi*, 278; to moulding of meat, 309; to *Neocosmospora vasinfecta*, 327; to *Nigrospora* on maize, 149; to *Ophiobolus graminis*, 621; to *Phoma terrestris*, 150; to pineapple wilt, 458; to *Pityrosporum ovale*, 696; to *Plasmodiophora brassicae* on cabbage, 807; to *Pleospora herbarum*, 124; to *P. lycopersici*, 799; to *Polyporus coffeeae* on coffee, 32; to *Pseudomonas carotae*, 211; to *P. savastanoi* and its var. *nerii*, 686; to *Pseudopeziza ribis*, 377; to *Puccinia graminis*, 293; to (?) *Pythium* on lucerne, 241;

to *P. arrhenomanes*, 95; to *P. ultimum* on potato, 605; to *Rhizoctonia zeae*, 233; to *Sclerospora graminicola* on *Setaria italica*, 577; to *Sclerotinia sclerotiorum*, 327; to *Sclerotium delphinii*, 147; to soil fungi, 121; to spike disease of sandal, 477; to *Synchytrium endobioticum* in sap, 526; to tobacco mosaic virus, 260, 659, 722, 782; to tobacco virus 1, 722; to tobacco virus 6, 535; to tobacco ring spot virus, 402, 659; to *Trametes pini*, 671; to turf diseases, 588; to *Typhula graminum*, 568; to *Urocystis tritici* on wheat, 24; to *Verticillium albo-atrum*, 74, 765; to *V. amaranti* and *V. dahliae*, 765; to *V. lateritium*, 124; to *V. tracheiphilum*, 765.

Hydrogen peroxide, use of, against wheat bunt, 48; as a seed disinfectant, 48, 619.

Hydroquinone, experimental control of grey speck of oats by, 393.

*Hylurgopinus rufipes* transmitting *Ceratostomella ulmi* on elm in U.S.A., 476.

*Hymenocallis calathina*, *Stagonospora curvata* can infect, 448.

*Hyoscyamus*, Hy III virus disease of, artificial production of intracellular bodies of, 51; transmission of, to Solanaceae, 51.

— mosaic can infect tobacco, 185.

— *niger*, *Synchytrium endobioticum* can infect, 788.

— — tobacco virus 1 (tomato fern leaf) on, in U.S.S.R., 132.

*Hypocrella amomi*, *Aschersonia caespitica* thought to be imperfect stage of, 443.

— *olivacea* synonym of *H. sphaeroidea*, 428.

— *reineckiana* on lecaniid scales in Sierra Leone, 428.

— *sphaeroidea* on lecaniid scales in Sierra Leone, 428; *Aschersonia* stage of, 428; *H. olivacea* synonym of, 428.

*Hypodermella hiratsukae* on pine in Japan, 802.

*Hypomyces haematococcus*, see *Nectria haematococca*.

*Hystrix*, *Puccinia rubigo-vera* on, specialization in, 746.

*Ilex*, see Holly.

Immunity in plants, biochemical factors of, 783.

— — —, histocytological aspects of, 602.

— — —, inheritance of, 116.

— — —, nature of, 189, 783.

— — — from virus diseases, 600.

Immunization of beans against *Botrytis cinerea*, 188, 602, 712, 783; of maize against *Diplodia zeae*, 751; of rice against *Corticium centrifugum*, *C. rolfsii*, and *Leptosphaeria salvinii*, 385; of tobacco against mosaic, 402; of tobacco and other Solanaceae against X virus of potato, 388; of plants against tobacco and tomato viruses, 601.

*Impatiens balsamina*, *Cercospora balsaminae* on, in India, 470.

[*Impatiens balsamina*], *Cercospora fukushiana* on, in Japan, 472.

— *biflora*, *Puccinia rubigo-vera* on, specialization in, 746.

Imperial Mycological Conference, 1934, Report on the, 325.

Infectious chlorosis, see Chlorosis, infectious.

— variegation, see Variegation, infectious.

Infra-red photography as an aid to phytopathological study, 384.

Injection of chemicals into apple against internal cork, 592; into plants against disease, 479.

‘Injecto-kyanization’ method of timber preservation, 206.

Insecticides, incorporation of, with fungicides, 701.

Internal bark necrosis of apple in U.S.A., 372.

— breakdown of pear in Italy, 373.

— — of peas in U.S.A., 341.

— browning of apple in U.S.A., 770.

‘— cork’ of apple in New Zealand, 592, 770.

— decline of lemon in Australia, 520.

— fruit mould of chilli in U.S.A., 344.

Iodine, toxicity of, to *Candida tropicalis*, 584, 759.

— -infusorial earth, use of, against *Fusarium culmorum* and *Helminthosporium sativum* on barley, oats, and wheat, 688.

Iodized paper wrappers, use of, against fruit storage rots, 321.

Ionic infiltration in relation to timber decay, 542, 543.

*Ipomoea batatas*, see Sweet potato.

*Ips* in relation to *Ceratostomella ips* and *C. pini* on pine in U.S.A., 68.

— *grandicollis* and *I. pini*, transmission of *Ceratostomella ips* and *Tuberculariella ips* on timber by, in U.S.A., 138.

*Irenina coffeae* on coffee in the French Cameroons, 397.

— *isertiae* on coffee in the Ivory Coast, 397.

*Irenopsis guianensis* on cacao in Venezuela, 397.

*Iris*, *Bacillus carotovorus* on, in England, 698.

— *Corticium centrifugum* on, in Japan, 719.

— *Heterosporium gracile* on, conidial stage of *Didymellina macrospora*, 448; control, 698; occurrence in England, 698; in Italy, 448; in U.S.A., 586; saltation in, 448.

— *Puccinia iridis* on, in England, 698; in Estonia, 530.

— *Pythium de Baryanum* on, in Sweden, 699.

— rhizome rot in England, 698.

— *Sclerotium delphinii* on, in U.S.A., 147.

— ‘scorch’ in England, 698.

*Iris reticulata*, *Myrosporium adustum* on, in Holland, 12.

Iron deficiency in relation to plant diseases, 469.

[Iron], effect of, on *Bacterium tumefaciens* and *Ricinus*, 647; on fungicides and vice versa, 597.  
 — salicylate, toxicity of, to *Tilletia caries*, 90.  
 — sulphate, toxicity of, to *Ceratostomella pini*, 276.  
 — — use of, against *Armillaria mellea* in orchards, 451; on citrus, 618; against 'brunissure' and chlorosis of vine, 214; against citrus chlorosis, 561, 753; against *Gloeosporium ampelophagum* on vine, 814; against *Phoma flaccida* on vine, 347.  
 — — see also Ferrous sulphate.  
*Irpea* on timber in Malaya, 540.  
*Isaria cretacea* on yeast in England, 471.  
*Isariopsis griseola* on bean in Brazil, 87, 734; in Spain, 396.  
*Ixora*, bacterial nodules of, 154.  
 — *chinensis*, *Cercospora ixorae* on, in Japan, 472.  
*Jasmine (Jasminum)* chlorosis in Bulgaria, 462.  
 — *Sclerotium coffeicolum* on, in Sierra Leone, 428.  
*Jatropa podagra*, *Botrytis cinerea* on, in Sierra Leone, 428.  
 'Jaunisse' and 'jaunissement' of beet, distinction between, 549.  
 Jonathan spot of apple in U.S.A., 592.  
*Juglans*, see Walnut.  
 June drop of citrus in Cyprus, 691.  
*Juniperus chinensis*, *Gymnosporangium haraeanaum* and *G. yamadae* on, in Japan, 533.  
 — — and *J. communis*, resistance of, to *Gymnosporangium juniperi-virginianae*, 150.  
 — *excelsa*, *Fomes juniperinus* on, in U.S.S.R., 62.  
 — *rigida*, *Gymnosporangium clavariae-forme* on, in Japan, 533.  
 — *scopulorum*, *Gymnosporangium globosum* on, in U.S.A., 368.  
 — — — *juniperi-virginianae* on, in U.S.A., 150.  
 — *virginiana*, *Gymnosporangium globosum* on, in U.S.A., 368.  
 — — — *juniperi-virginianae* on, in U.S.A., 150, 349.  
 — — — *Phomopsis* on, in U.S.A., 150.  
*Kabatiella caulincola* on clover in Estonia, 241; in U.S.A., 85.  
*Kalanchoë*, *Oidium calanchoeae* ..., in Germany, 586.  
 — *blossfeldiana*, (?) *Fusarium herbarum* [*F. avenaceum*] on, in Germany, 637.  
 — — — *Oidium* on, in Germany, 637.  
*Kale (Brassica oleracea var. acephala)*, cauliflower virus affecting in U.S.A., 207.  
*Kalanchoë latifolia*, *Pestalozzia macrotricha* on, in Italy, 608.  
*Kaolin*, use of, as a filler, 213, 500.  
*Kauai* disease of pineapple in Hawaii, 455.  
*Kerrol*, use of, against *Sclerotium rolfsii* on potato, 560.  
*Kieserite*, use of, against magnesium deficiency disease of potato, 649.  
 'Killgerm', use of, against *Ceratostomella fimbriata* on rubber, 791.  
*Klein-Tillator* seed disinfection apparatus, 519.  
*Kloeckera*, a genus of the *Torulopsoidae*, 193.  
*Koeleria cristata*, *Cercosporalla herpotrichoides* and *Wojnowicia graminis* on, in U.S.A., 569.  
*Kohlrabi (Brassica oleracea var. caulorapa)* diseases, control, 277.  
 — *Pseudomonas campestris* on, in Bulgaria, 1.  
*Kojic acid*, production of, by moulds, 52.  
*Kolodust*, use of, against *Coccomyces hemalis* on cherry, 706; against *Coleosporium solidaginis* on China aster, 364.  
*Kolofog*, use of, against *Sporotrichum citri* on citrus, 693; against *Venturia inaequalis* on apple, 591, 683.  
*Koloform*, use of, against *Bacterium pruni* and *Cladosporium carpophilum* on peach, 683.  
*Kontramix* seed disinfection apparatus, 519.  
*Koppers* flotation dry-wettable and sulphur paste, use of, against *Venturia inaequalis* on apple, 591.  
 'Korab' of tobacco in Sumatra, 473.  
 'Kringerheid', 'Kringerigkeit', and 'Kringerkrankheit' of potato synonymous with concentric necrosis, 253.  
*Kuehneola desmium*, see *Cerotellum desmum*.  
*Kumquat (Fortunella margarita)*, *Colletotrichum gloeosporioides* on, in the Argentine, 15.  
*Kupfer-meritol*, use of, against *Plasmodara viticola* on vine, 47.  
*Labrella coryli* on *Corylus avellana* in Italy, 680.  
*Laburnum vulgare*, infectious variegation of, in Bulgaria, 462.  
(?) *Labyrinthula* on *Zostera marina* in U.S.A., 599.  
*Lachnella pini* renamed *Dasyctyphula pini*, 266.  
*Lactarius* on beech, birch, and larch forming mycorrhiza, 463.  
*Lactuca sativa*, see Lettuce.  
*Lagenaria vulgaris*, *Pythium aphanidermatum* can infect, 7.  
 — — var. *depressa*, *Corticium centrifugum* on, in Japan, 719.  
*Lagenidium giganteum* on *Daphne*, copepods, and mosquito larvae in U.S.A., 758.  
*Lamarkia aurea*, *Puccinia lolii* can infect, 435.  
*Lambertella corni-maris* can infect lemon, orange, parsnip, plum, quince, and turnip, 451.  
 — — on apple may be identical with *Phaeosclerotinia nipponica*, 451; occurrence in Germany, 451.  
 — — on apricot in New S. Wales, 774.  
 — — on *Cornus mas* and pear in Germany, 451.

*Lantana camara* in relation to spike disease of sandal in India, 539.  
 — and *L. mista*, *Cercospora formosana* on, in Japan, 471.  
*Larch (Larix)*, *Dasyphypha calycina* on, in England, 264.  
 —, *Fomes annosus* on, in Great Britain, 803.  
 —, *Mycelium radicis nigrostrigosum* on, forming mycorrhiza in Sweden, 187.  
 —, *Poria subacida* on, in U.S.A., 805.  
 —, *Stereum sanguinolentum* on, in U.S.A., 728.  
*Larkspur*, see *Delphinium*.  
*Lasianthus*, bacterial leaf nodules of, 154.  
*Lathyrus odoratus*, see Sweet pea.  
*Layia*, spotted wilt of tomato can infect, 404.  
 LE 5, use of, against fungi on timber, 612; as preservative for cordage, 613.  
 Lead, action of, on fungi, 646, 647; on fungicides and vice versa, 597.  
 — arsenate, use of, with fungicides, 43, 242, 591, 700.  
 — compounds, use of, as fungicides, 244, 382, 496.  
 — salicylate, use of, against wheat bunt, 90, 228.  
 Leaf curl of cotton, breeding against, 165; control, 165, 757; factors affecting, 165, 579; occurrence in Fiji, 98; in Italian Somaliland, 579; in the Sudan, 165, 757; study on, 165; types of, 98, 579; varietal resistance to, 165, 358.  
 — of Malvaceous weeds in the Sudan, 165.  
 — of raspberry in U.S.A., 181, 642.  
 — of tobacco, control, 533, 678; leprosous tobacco identical with, 335; losses caused by, 678; occurrence (?) in the Belgian Congo, 679; in Dutch E. Indies, 533; in Madagascar, 335, 686; in Rhodesia, 678; in Tanganyika, 60; *Phthorimaea operculella* in relation to, 335; synonymy of, 335; transmission of, by Aleyrodidae, 335, 533.  
 — fall of pine in Rumania, 483.  
 — mottle of fig in Western Australia, 706.  
 — roll of potato, anatomical differentiation of, 116; control, 715, 784; effect of, on physiology of host, 52, 190, 465; on yield, 786; factors affecting, 387; history of research on, 54; method of diagnosing, from the tuber, 388; occurrence in Brazil, 524; in France, 327; in Germany, 190, 387, 388, 650; in Italy, 328, 781, 786; in New Zealand, 715; in U.S.A., 496, 784; in U.S.S.R., 52, 117; relation of, to potato net-necrosis, 253; serological study on, 327; study on, 190; transmission of, by *Aphis abbreviata*, 496.  
 — of tomato in U.S.S.R., 335.  
 — of vine in Germany, 79; in Italy, 679.  
 — scorch of beet in Europe, 548.  
 — spots of tobacco in U.S.A., 724.  
 — spotting of tobacco in Belgium, 260.  
*Leafhoppers*, *Verticillium fuliginosum* on, in Panama and Surinam, 443.  
*Lecaniiid*, *Hypocrella reineckiana* and *H. sphaeroidea* on, in Sierra Leone, 428.  
*Lecanium persicae*, *Cephalosporium lecanii* on, in the Argentine, 98.  
 — *viride*, *Cephalosporium lecanii* on, in the Seychelles, 305.  
*Lecithin*, see Phosphatide.  
*Lecythophora lignicola* on wood pulp, antagonism of Mycorolae to, 69; occurrence in Scandinavia, 140, 545; in Sweden, 69, 275.  
*Ledum glandulosum*, *Cryptostictis arbuti* on, in U.S.A., 66.  
 —, *Exobasidium ledi* on, in U.S.A., 65.  
*Leek (Allium porrum)*, *Actinomyces* on, in Sweden, 340.  
 — diseases in England, 414; in Germany, 277.  
 Legislation against *Actinomyces scabies* on potato in Egypt, 544; in Sweden, 672.  
 — *Bacillus amylovorus* on fruit trees and other hosts in Australia, 64.  
 — *Bacterium salicis* on *Salix* in U.S.A., 400.  
 — *tumefaciens* on loquat, olive, and other fruit trees in Egypt, 543.  
 — *vesicatorium* on chilli and tomato in Cuba, 400.  
 — banana diseases in Eritrea, 816; in Jamaica, 815.  
 — cacao moulds in U.S.A., 14.  
 — *Ceratostomella ulmi* on elm in England, 735; in U.S.A., 336, 480.  
 — citrus diseases in Spain, 480; in U.S.S.R., 816.  
 — *Cronartium ribicola* on currant and gooseberry in U.S.A., 544.  
 — *Fusarium* on potato in Sweden, 672.  
 — *Limacinia citri* on orange and other citrus in Spain, 480.  
 — mushroom diseases in Canada, 400.  
 — *Nectria galligena* on fruit trees in England, 336; in Germany, 736.  
 — *Peronospora tabacina* on tobacco in New S. Wales, 200.  
 — *Phytophthora infestans* on potato in Sweden, 672.  
 — plant diseases in Australia, 64; in Austria, 543; in Brazil, 544; in the British Empire, 325; in British Honduras, 64; in Cyprus, 736; in Czechoslovakia, 400; in England and Wales, 272; in the French Cameroons, 480; in Germany, 736; in Great Britain and Northern Ireland, 400; in Jamaica, 64; in New Zealand, 64; in Norway, 64; in Palestine, 544; in Peru, 64; in the Philippines, 64; in Poland, 544; in Rumania, 49; in Samoa, 64; in Spain, 424; in Syria, 64; in U.S.A., 816; anomalies of, 543.  
 — *Pseudomonas citri* on citrus in Egypt, 543; in U.S.A., 64.  
 — *citripeteale* on citrus in Egypt, 543.  
 — *saliciperda* on *Salix* in U.S.A., 400.  
 — *Puccinia graminis* on barberry in

New S. Wales, 815; in U.S.A., 63, 672.

[Legislation against] *Sclerotinia cinerea* and *S. fructigena* on fruit trees in England, 336.

— *Spongospora subterranea* on potato in Egypt, 544; in Sweden, 672; in U.S.S.R., 336.

— strawberry diseases in U.S.S.R., 595.

— sugar-cane diseases in Queensland, 332; in U.S.A., 208.

— mosaic in Peru, 736.

— *Synchytrium endobioticum* on potato in Austria, 64; in Denmark, 544, 788; in Egypt, 544; in Germany, 400, 715, 736, 815; in Norway, 64, 788; in Sweden, 672, 788; in U.S.S.R., 336.

— *Taphrina cerasi* on cherry in Germany, 736.

— transport of plants by air (proposed), 325; in Cyprus, 736.

— *Urocystis cepulae* on onion in Egypt, 544.

— *tritici* on wheat in U.S.S.R., 23.

— *Venturia inaequalis* on apple and *V. pirina* on pear in England, 336, 672.

— regulating co-operative seed disinfection in Germany, 736; the sale of plant protectives in France, 814.

Lemon (*Citrus limonia*), *Botryosphaeria ribis chromogena* on, in U.S.A., 196; host range of, 196.

—, *Colletotrichum gloeosporioides* on, in the Argentine, 15.

—, *Daeterophoma tracheiphila* on, (?) identical with Trabut's infectious chlorosis, 505; occurrence in Cyprus, 83; in Italy, 505, 680; varietal resistance to, 680.

—, *Diaporthe citri* on, in New S. Wales, 161.

—, *Diplodia (Microdiplodia) warburgiana* on, in Cyprus, 742.

—, *Dothiorella* on, in Cyprus, 83, 742.

—, *Hendersonula toruloides* on, in Cyprus, 83; *Torula* form of, 83.

—, internal decline of, in Australia, 520.

—, *Lambertella corni-maris* can infect, 451.

—, *Mucor paronychius* can infect, 236.

—, *Penicillium digitatum* and *P. italicum* on, antagonism of, 30.

—, peteca of, suggested virus nature of, 505.

—, *Sclerotinia sclerotiorum* on, in Cyprus, 742.

—, *Sporotrichum citri* on, control, 162, 742; occurrence in Java, 742; in New S. Wales, 162; (?) in U.S.A., 348.

—, *Trichoderma koningii* on, 164.

—, — *lignorum* on, in U.S.A., 163.

Lentils (*Lens esculenta*), *Bacillus proteus vulgaris* on, antibody formation against, 713.

*Lentinus lepideus* on wood pulp in England, 137.

—, — use of, in tests of timber preservatives, 276, 412.

*Lenzites abietina*, use of, in tests of timber preservatives, 412.

— *betulina*, polarity and sexual repulsion in, 645.

— *sepiaria*, on timber in Canada, 484; in England, 137.

—, —, relation of, to *Trametes americana*, 795.

*Lepidiota* in relation to pineapple wilt in Queensland, 457.

*Lepidosaphes beckii*, *Podonectria eociccola* on, in the Argentine, 98.

—, —, *Septobasidium albidum* on, in the Argentine, 630.

'Lepra' disease of *Pogostemon comosus* in Sumatra, 153.

Leprosis (scaly bark) of citrus, suggested virus nature of, 505.

*Leptinotarsa decemlineata*, *Beauveria doryphorae* on, in France, 507.

*Leptographium microsporum* on timber in U.S.A., 729.

*Leptomonas* in latex of *Strophantus balansae* in Indo-China, 709.

Leptonecrosis of apricot and cherry in Italy, 454.

— of plum in Italy, 320, 374, 455, 800; wrongly attributed to *Ceratostomella ulmi*, 374, 800.

*Leptosphaeria* in the Arctic atmosphere, 461.

— *bataticola* on sweet potato in U.S.S.R., 651.

— *coniothyrium* on raspberry in U.S.A., 181.

— on rose in England, 313; in Japan, 498.

— on strawberry in England, 180; (?) in Holland, 12.

— *sacchari* on sugar-cane, factors affecting, 57; occurrence in U.S.A., 57; in Venezuela, 397; *Phyllosticta* (?) *saccharicola* a stage of, 57; secondary to *Helminthosporium ocellum*, 57.

— *salvinii* on rice, control, 468; *Helminthosporium sigmaeum* conidial stage of, 119; immunization against, 385; occurrence in Indo-China, 468; in U.S.A., 119; *Sclerotium oryzae sclerotiorum* stage of, 119.

*Leptosphaerulina bataticola* on sweet potato in U.S.S.R., 651.

*Leptothyrium nervisedum* imperfect stage of *Gnomonia nerviseda*, 537.

— *pomi* on apple in S. Africa, 452.

*Lespedeza*, *Uromyces lespedezae-procumbens* on, in Japan, 516.

Lettuce (*Lactuca sativa*), *Aecidium lactucae-sativae* on, in Rumania, 215.

—, *Bacterium formosanum* can infect, 738.

—, — *lactucae* on, in Japan, 498.

—, — *marginale* and *Bact. viridilividans* on, 16.

— big vein of, in U.S.A., 283; relation of, to wheat mosaic, 283.

—, *Botrytis* on, in England, 730.

—, *Bremia lactucae* on, in U.S.A., 683.

—, celery yellows can infect, 313.

—, *Cercospora beticola* on, in U.S.A., 149.

—, — *longissima* on, in Japan, 472.

[Lettuce], *Corticium solani* on, in U.S.A., 73.  
 — diseases, control, 277, 563, 673; occurrence in England, 414.  
 — mosaic in England, 730; transmission of, (?) by *Macrosiphum sonchi*, 730.  
 —, *Mucor racemosus* on, soil Mucorineae in relation to, 655.  
 —, *Pseudomonas endiviae* on, in Germany, 418.  
 —, — (?) *intybi* on, in Germany, 418.  
 —, — *syringae* can infect, 418.  
 —, tomato spotted wilt affecting, 201; in U.S.A., 212.  
*Leuco-Fomes*, a section of the genus *Fomes*, 795.  
*Leucojum vernum*, *Stagonospora curtisii* can infect, 448.  
*Leucostoma persoonii*, see *Valsa leucostoma*.  
*Libocedrus decurrens*, *Bacterium tumefaciens* on, in U.S.A., 289.  
 —, —, *Polyporus amarus* on, in U.S.A., 205.  
*Litchheimia italica* can infect tomato, 405.  
 Light, effect of, on maize streak virus, 146; on *Peronospora parasitica* on cabbage, 546; on tobacco mosaic virus, 198; on *Typhula graminum* on cereals, 568; on various rusts, 747.  
 —, see also Ultra-violet rays, X-rays.  
 Lightning injury to cotton in U.S.A., 629.  
 — to oil palm in Malaya, 357.  
 Lignasan, composition and use of, against blue stain of timber, 729.  
*Ligniera* on beet and grass in Holland, 12.  
 — *vascularum* on sugar-cane in Venezuela, 397.  
 Lignin, effect of, on soil microflora, 392.  
*Ligustrum* (?) *japonicum*, *Phytophthora omnivorum* on, in U.S.A., 562.  
 — (?) *ovalifolium*, little leaf of, in U.S.A., 768.  
 —, —, *Phytophthora omnivorum* on, in U.S.A., 562.  
 Lilac (*Syringa vulgaris*) mosaic in Bulgaria, 462; in Canada, 494.  
 —, obscure disease of, in Germany and Holland, 38.  
 —, *Pseudomonas syringae* on, comparison of, with allied forms, 16; occurrence in Belgium, 447; in Germany, 418; in Holland, 319; in U.S.A., 319.  
 —, ring spot of, in Bulgaria, 462.  
 Lily (*Lilium*), *Botrytis elliptica* on, in England, 513.  
 —, celery virus affecting, in U.S.A., 615.  
 — mosaic in Brazil, 634; in Japan, 764.  
 —, *Phytophthora* on, in U.S.A., 147.  
 —, — *cactorum* and *P. parasitica* on, in Japan, 147, 498.  
 —, rot of bulbs of, from Japan, 513.  
 —, *Sclerotium delphinii* on, in U.S.A., 147.  
 —, *Thielaviopsis basicola* on, in England and Wales, 492.  
 — 'twist' in Bermuda, 559; (?) a form of mosaic, 560.  
 —, (?) yellow flat of, in Java, 153.  
*Limacinia citri* on citrus, legislation against, in Spain, 480.  
 Lime (*Citrus aurantifolia*), *Diaporthe citri* on, in U.S.A., 564.  
 —, *Diplodia* on, in U.S.A., 86.  
 —, — *natalensis* on, in U.S.A., 564.  
 —, *Fusarium solani* and *F. semitectum* on, in India, 472.  
 —, *Gloeosporium limetticolum* on, in St. Lucia, 84.  
 —, *Sporotrichum citri* on, in U.S.A., 348.  
 —, trunk girdling of, in U.S.A., 86.  
 —, 'xyloporosis' of, in Cyprus, Palestine, and Syria, 162.  
 Lime, effect of high-magnesium content of, on Bordeaux mixture, 607, 677.  
 —, use of, against *Bacterium solanacearum* on potato in U.S.A., 563; with zinc sulphate, 176, 441.  
 —, hydrated, use of, against *Pythium* on beet, 588.  
 —, —, use of, after copper treatment of wheat seed, 25; with copper-bentonite fungicides, 381; with zinc sulphate, 682, 683, 753.  
 —, — sulphur, cost of, 589.  
 —, —, effect of, on carbon assimilation of apple leaves, 183, 562.  
 —, —, injury, 562.  
 —, —, specification for, 598.  
 —, —, iron sulphate spray, 701.  
 —, —, dry, consumption of, in U.S.A., 707.  
 —, —, —, injury, 151.  
 Lime tree (*Tilia*), *Nectria ditissima* or *N. galligena* on, in U.S.A., 338.  
 —, —, *Poria subacida* on, in U.S.A., 805.  
 —, —, *Ustulina vulgaris* on, action of, on wood substance, 667.  
 Linco colloidal paste, use of, against *Gymnosporangium juniperi-virginianae* on apple, 684.  
 Linseed (*Linum usitatissimum*), *Macrophomina phaseoli* on, in India, 561.  
 Linseed oil as a spreader, 164.  
 Linsocresyl, use of, against *Ceratostomella fimbriata* on rubber, 791.  
*Liquidambar formosana*, *Fomes ulmarius* on, in Japan, 532.  
*Liriodendron tulipifera*, *Nectria galligena* on, in U.S.A., 407.  
 Little leaf of almond in U.S.A., 176.  
 — of apple, control, 176, 767, 768; factors affecting, 449; occurrence in S. Africa, 42; in U.S.A., 176, 449, 767, 768.  
 — of apricot, control, 176, 768; occurrence in S. Africa, 42; in U.S.A., 176, 768.  
 — of citrus in U.S.A., 768; suggested virus nature of, 505.  
 — of fig in U.S.A., 768.  
 — of fruit trees, 'corral spot' sickness may be identical with, 767; etiology of, 176, 449, 642, 767; occurrence in Italy, 318; in U.S.A., 642, 767.  
 — of *Ligustrum* (?) *ovalifolium* and *Melia azedarach* in U.S.A., 768.  
 — of peach, control, 176, 767, 768; factors affecting, 449; occurrence in U.S.A., 176, 449, 767, 768.  
 — of pear in S. Africa, 42.

[Little leaf] of pecan in U.S.A., 767, 768.  
 —— of plum, control, 43, 176, 767, 768;  
 factors affecting, 449; occurrence in S. Africa, 42; in U.S.A., 176, 449, 767, 768.  
 —— of poplar in U.S.A., 768.  
 —— of vine and walnut in U.S.A., 176, 767, 768.  
 —— peach disease of peach in U.S.A., 219, 682, 704; transmission of, by *Macropsis trimaculata*, 682, 704; by plum stocks, 682; virus of, affecting plum in U.S.A., 682, 705; *Prunus salicina* in U.S.A., 705.

Locusts, *Empusa grylli* on, cultivation of, 98, 234; occurrence in Rhodesia, 427; in S. Africa, 98, 234.  
 —, *Fusarium acridorum* on, in S. Africa, 99.  
 —, *Sporotrichum globuliferum* on, in the Argentine, 98; in S. Africa, 99.  
 —, — *paranense* on, in the Argentine, 98; (?) in S. Africa, 99.

Loganberry (*Rubus loganobaccus*), *Byssochlamys fulva* on, in England, 775.  
 —, *Haplosphaeria deformans* on, in Canada, 495.

*Lolium italicum*, *Septoria passerinii* on, in Spain, 396.  
 —, *multiflorum*, *Helminthosporium siccans* can infect, 515.  
 —, *perenne*, *Corticium fuciforme* on, in Great Britain, 587.  
 —, — *solani* on, 603.  
 —, — endophyte of, 700.  
 —, *Helminthosporium siccans* can infect, 515.  
 —, *temulentum*, endophyte of, 700.

*Lophodermium pinastri* on forest trees in Poland, 663.  
 —— on pine in U.S.A., 663.

Loquat (*Eriobotrya japonica*), *Acochyta eriobotryae* on, in Italy, 777.  
 —, *Bacillus amylovorus* on, in Italy, 778.  
 —, *Bacterium tumefaciens* on, legislation against, in Egypt, 544.  
 —, *Botrytis* on, in Japan, 498.  
 —, 'burning-back' of, in Australia, 520.  
 —, *Entomosporium* on, in Japan, 498.  
 —, *Fusicladium dendriticum* var. *eriobotryae* and *Macrophoma malorum* on, in Italy, 777.  
 —, *Phoma eriobotryae* on, in Italy, 778.  
 —, *Phomopsis* on, intercepted in U.S.A., from Italy, 816.  
 —, *Physalospora obtusa* on, in Italy, 777.  
 —, *Phytophthora cactorum* on, in Japan, 147.  
 —, — *parasitica* f. *eriobotryae* on, in Italy, 778.  
 —, (?) *Stilbum* on, in Tanganyika, 13.

Lothra seed disinfection apparatus, 519.

Low temperature breakdown of apple, control, 41; factors affecting, 41, 42, 243, 592; occurrence in England, 41, 42; in U.S.A., 41, 243, 592, 770; studies on, 41, 243; soft scald identical with, 770.  
 —— — of grapefruit from Portuguese E. Africa and S. Africa, 754.  
 —— — of orange from S. Africa, 754.

Lucerne (*Medicago sativa*), *Aplanobacter insidiosum* on, breeding against, 149, 174, 515; method of infection by, 109; note on, 682; occurrence in U.S.A., 109, 149, 174, 222, 515, 638, 682; studies on, 174, 515, 638; varietal resistance to, 149, 222.

—, *Bacillus radicicola* on, bacteriophage of, 744; occurrence in France, 744.

—, beet curly top affecting, in U.S.A., 171.

—, *Colletotrichum destructivum* on, in U.S.A., 85.

—, *Corticium solani* can infect, 208, 603.

—, *Oidiodia taurica* on, in Cyprus, 83.

—, *Plenodomus meliloti* on, in Canada, 175.

—, *Pseudomonas alfalfa* on, in U.S.A., 766.

—, *Pseudopeziza jonesii* on, in Canada, 494; *Pyrenopeziza medicaginis* synonym of, 494.

—, — *medicaginis* on, in France, 424.

—, *Pythium* on, in U.S.A., (?) 241, 588.

—, *Sclerotinia* on, in Canada, 175.

—, witches' broom of, in New S. Wales, 516.

*Luffa cylindrica*, *Pythium aphanidermatum* can infect, 7.

Luminosity of *Omphalia flava*, 184.

'Lunevale' dry Bordeaux mixture, 200.

Lupin (*Lupinus*), *Fusarium* on, in Germany and New Zealand, 109.  
 —, reclamation disease of, in Germany, 255.  
 —, 'sore shin' disease of, (?) in Germany, 108; in New Zealand, 109.

—, tomato spotted wilt can infect, 201.

*Lycopersicum esculentum*, see Tomato.

—, *pimpinellifolium*, *Aplanobacter michiganense* on, resistance to, 682.

—, *Cladosporium fulvum* on, resistance to, 202.

—, cucumber mosaic affecting, in U.S.A., 473.

—, tobacco virus 1 can infect, 473.

—, turnip mosaic can infect, 731.

*Lycoris squamigera*, *Stagonospora curtissii* can infect, 448.

*Lygus pratensis* transmitting swede mosaic, 732.

Lysol, use of, against *Uncinula necator* on vine, 9.

M 29 virus of potato, probably a mixture of M 23 and R 77, 649.

*Macrophoma* on spruce in U.S.S.R., 68.

—, *dalmatica* on olive in Cyprus, 83.

—, *kuwatsukaii* imperfect stage of *Physalospora spirae* 640.

—, *malorum* on loquat in Italy, 777.

*Macrophomina phaseoli* on bean in Cyprus, 83; in U.S.A., 670.

—, — on beet, begonia, and citrus in U.S.A., 670.

—, — on cotton, factors affecting, 360, 561; occurrence in India, 360, 561; in the Sudan, 756; in U.S.A., 670.

—, — on cowpea, genetics of resistance to, 208; occurrence in Cyprus, 742; in U.S.A., 208, 670; varietal susceptibility to, 742.

[*Macrophomina phaseoli*] on currant and eggplant in Cyprus, 83.  
 — on groundnut in Uganda, 82.  
 — on *Hibiscus esculentus* in Cyprus, 83.  
 — on linseed in India, 561.  
 — on papaw in Sierra Leone, 428.  
 — on *Piper betle* in India, 718.  
 — on potato and sesame in Cyprus, 83.  
 — on sorghum in India, 560.  
 — on strawberry in U.S.A., 670.  
 — on sugar-cane in India, 80.  
 — on sweet potato in U.S.A., 528, 670.  
 — on tea in Nyasaland, 561.  
 — on tomato and *Vigna* in Cyprus, 83.  
 —, parasitism of, 233, 670.  
 —, *Trichoderma lignorum* can parasitize, 249.

*Macropsis trimaculata*, transmission of little peach disease by, in U.S.A., 682, 704; (?) of peach 'red suture' by, in U.S.A., 498; of peach yellows by, in U.S.A., 498, 682, 704, 705.

*Macrosiphum gei*, transmission of cucumber mosaic by, 473; of pea mosaic by, 415, 486; of pea mosaic virus 2 by, 415; of potato calico by, 787; of tobacco virus 1 by, 473.  
 — *pisi*, transmission of broad bean mosaic by, 4; of pea mosaic by, 415, 486; of pea mosaic virus 2, by, 415.  
 — *sonchi*, transmission of (?) lettuce mosaic by, 730.

*Macrosporium* in the Arctic atmosphere, 461.  
 — on wheat in Algeria, 91.  
 — *carotae* on carrot in Bermuda and U.S.A., 560; sporulation of, 399.  
 — *nigricans* on cotton in Brazil, 87.  
 — *pelargonii* on *Pelargonium* in Italy, 681.  
 — *saponariae* on *Saponaria officinalis* in Esthonia, 530.  
 — *sarcinaeforme*, conidial stage of *Pleospora lycopersici*, 799.

Magnesium carbonate, use of, against manganese deficiency in potato, 649; against manganese injury to plants, 404.  
 — chloride, effect of, on mould growth on textiles, 585.  
 — deficiency in buckwheat and clover in U.S.A., 645.  
 — in cotton in U.S.A., 649.  
 — in mangold and maize in U.S.A., 645.  
 — in potato in U.S.A., 645, 649.  
 — in spinach, tobacco, and turnip in U.S.A., 645.  
 — in various plants, 469.  
 — salicylate, effect of, on wheat germination, 228.

Magnetic (sulphur) spray, use of, against *Venturia inaequalis* on apple, 591.

Maize (*Zea mays*), *Aplanobacter stewartii* on, bacteriophage of, 503; factors affecting, 160, 348; genetics of resistance to, 751, 752; note on, 562; occurrence in U.S.A., 94, 151, 160, 348, 496, 503, 562, 752; overwintering of, in *Chaetocnema pulicaria*, 94, 753; in (?) other insects, 94; phenology of, 160; study on, 160; varietal resistance to, 151, 354.

[Maize], *Aspergillus* on, in U.S.A., 232.  
 —, *flavus* and *A. tamarii* on, in U.S.A., 355.  
 —, *Bacterium holci* on, 16.  
 —, — *setariae* can infect, 356.  
 —, — *vascularum* can infect, 354.  
 —, boron deficiency in, 233.  
 —, celery virus 1 affecting, (?) in Hawaii, 94; in U.S.A., 93, 553, 615.  
 —, *Ophiobolus heterostrophus* on, 125; *Ophiobolus heterostrophus* renamed, 125.  
 —, *Diplodia* and *D. frumenti* on, 564.  
 —, — *macrospora* on, in Brazil, 355; in U.S.A., 86, 564.  
 —, — *zeae* on, control, 221, 232, 751; factors affecting, 221, 751; immunization against, 751; losses caused by, 437; occurrence in U.S.A., 86, 220, 232, 437, 751; *Ustilago zeae* in relation to, 437.  
 — diseases in Kenya, 744; losses caused by, in U.S.A., 780.  
 —, *Fusarium* on, in Kenya, 431.  
 —, — *culmorum* on, in Rumania, 215.  
 —, *Gibberella* (?) *fujikuroi* var. *subglutinans* on, in Kenya, 427.  
 —, — *moniliformis* on, control, 232; losses caused by, 437; occurrence in the Argentine, 720; in U.S.A., 232, 437; in U.S.S.R., 297, 493; studies on, 437.  
 —, — *saubinetii* on, control, 232, 355, 751; factors affecting, 355, 437, 690; losses caused by, 437; occurrence in U.S.A., 232, 437, 690, 749, 751; seed coat injury in relation to, 355; variation in, 749.  
 —, *Helminthosporium leucostylum* and *H. nodulosum* can infect, 440.  
 —, — *turcicum* on, in Kenya, 431; in Madagascar, 685.  
 —, magnesium deficiency in, in U.S.A., 645.  
 —, *Nigrospora* on, control, 751; factors affecting, 149; occurrence in U.S.A., 149, 751; in U.S.S.R., 493.  
 —, *Ophiobolus graminis* can infect, 503.  
 —, *Penicillium* on, in U.S.A., 232.  
 —, — *oxalicum* on, in U.S.A., 355.  
 —, *Physalospora zeicola* on, in U.S.A., 86, 564.  
 —, *Puccinia maydis* on, breeding against, 431, 626; factors affecting, 747; occurrence in Kenya, 431; in U.S.S.R., 292; physiologic form of, 626.  
 —, *Pythium arrhenomanes* on, in U.S.A., 95.  
 —, reclamation disease of, in Germany, 255.  
 —, *Rhizoctonia zeae* on, in U.S.A., 232.  
 —, *Rhizopus* on, in U.S.A., 232.  
 — streak in Kenya, 744; (?) in Rhodesia, 626; studies on, 146, 246; transmission of, by *Cicadulina mbila* and *C. zeae*, 146.  
 —, *Ustilago zeae* on, effect of, on suscepti-

bility to ear rots, 437; on yield, 354, 436; factors affecting, 690; losses caused by, 94; method of infection by, 94; of inoculating, 750; note on, 355; occurrence in England, 423, in Holland, 11; in Italy, 690; in U.S.A., 94, 354, 436, 504, 750; in U.S.S.R., 493; specialization in, absence of, 355, 504; studies on, 436, 504, 750; varietal susceptibility to, 690.

[Maize], 'white bud' of, in U.S.A., 576.

—, — stripe of, in Cuba, 93.

'Mal di gomma' of grapefruit and orange in Venezuela, 398.

Malachite green, toxicity of, to *Verticillium albo-atrum*, *V. amaranti*, *V. dahliae*, and *V. tracheiphilum*, 765.

—, — use of, against *Calonectria graminicola* on turf, 588; against *Corticium fuciforme* on turf, 587, 588; in culture studies of *Phytophthora*, 398.

'Maladie des tâches en couronne' of potato, synonym of potato concentric necrosis, 253.

*Malassezia furfur* on man in Costa Rica, 169.

Maleic acid, use of, with ethereal oils against moulds on fruit, 450.

*Malva rotundifolia*, *Cercospora beticola* on, in U.S.A., 149.

Malvaceous weeds, leaf curl of, in the Sudan, 165.

*Mamillaria valida*, *Monosporium cactacearum* on, in Italy, 765.

Man, *Achorion* on, in Hungary, 104; in Morocco, 102.

—, — *indicum* on, in India, 35.

—, — *schoenleini* on, in Costa Rica, 169.

—, — *Accladium castellanii* on, 308.

—, — *Acrostalagmus cinnabarinus* on, in Hungary, in relation to *Microsporonaudouini*, on, 695.

—, — *Acrothecium nigrum* on, in U.S.A., 36.

—, — *Actinomyces israeli* on, in Algeria, 168.

—, — *Ascotricha chartarum* var. *orientalis* on, in China, 308.

—, — *Aspergillus* on, in Japan, 510.

—, — *candidus* on, in China, 633.

—, — *unguis* on, in Costa Rica, 169.

—, bacterial pathogens of, can infect tomato, 405.

—, — *Blastodendron schweitzeri* on, in French Equatorial Africa, 631.

—, — *Blastomyces dermatitidis* on, see *Endomyces dermatitidis* on.

—, — *Botrytis cinerea* on, in Hungary, 695.

—, — *Candida* on, as a type of mycosis, 631.

—, — *albicans* on, 100; (?) in U.S.A., 631, 632.

—, — *bronchialis* on, in Italy, 509.

—, — *macedoniensis* on, in Chi

—, — *montpellieri* on, in Augena, 168.

—, — *pinoyi* on, in China, 308; in Italy, 509.

—, — *Cephalosporium acremonium* on, in Hungary, 695.

—, — *recifei* on, in

—, — *serrea* on, in

—, — synonym of, 36

[Man], chromoblastomycosis of, distribution of, 509.

—, — *Cladosporium tropicalis* on, in French Equatorial Africa, 695.

—, — *Coccidioides immitis* on, as a type of mycosis, 631; biology of, 361, 362; occurrence in Brazil, 759; in U.S.A., 169; *Scopulariopsis americana* synonym of, 100; studies on, 100, 169, 361, 362, 444, 445; systematic position of, 234.

—, — var. *meteuropeaea* on, in Italy, 101, 445; *Glenospora meteuropeaea* renamed, 101.

—, — *Cordyropsis hominis* var. *sphaerocnidica* on, in Italy, 105.

—, — *Cryptococcus farcinosus* on, 100, 631.

—, — *hominis* on, note on, 100; *Torula histolytica* (?) synonym of, 100.

—, — *muris* on, 631.

—, — *Endodermophyton tropicale* on, see *Trichophyton concentricum* on.

—, — *Endomyces albicans* on, in France, 581, 582.

—, — *dermatitidis* on, as a type of mycosis, 631; note on, 100; occurrence in U.S.A., 99; synonymy of, 99, 100, 582.

—, — *Epidermophyton*, Kaufmann-Wolf's, on, in Hungary, 104; regarded as a variant of *Trichophyton mentagrophytes*, 759.

—, — *fluccosum* on, 759.

—, fungi on, effect of age of media on culture of, 510; Italian systematic treatise on, 167; pathogenicity of, to tomato, 405.

—, — *Gilchristia dermatitidis* on, *Blastomyces dermatitidis* renamed, 100; synonymy of, 99, 100. (See also *Endomyces dermatitidis*.)

—, — *Gliocladium* on, in Costa Rica, 169.

—, — *Hemispora coremiformis* on, in Costa Rica, 583.

—, — *stellata* on, in Costa Rica, 169.

—, — *Hormondendrum algeriensis* on, in Algeria, 168, 509.

—, — *langeroni* on, in Costa Rica, 168.

—, — *Malassezia furfur* on, in Costa Rica, 169.

—, — *Microsporon* on, diagnosis of, 103.

—, — *audouini* on, *Acrostalagmus cinnabarinus* in relation to, 695; diagnosis of, by Wood's rays, 510; occurrence in Germany, 102; in Hungary, 695.

—, — *felineum* on, in Costa Rica, 169.

—, — *japonicum* on, in Manchukuo, 35.

—, — *paraferrugineum* on, in Brazil, 760.

—, — *sapporoense* on, in Japan, 103.

—, — *Monilia* on, in Colombia, 758; toxicity of dyes to, 758. (See also *Candida* on.)

—, — *Monosporium engelhardtii* on, in Hungary, 695.

—, — *Mucor paronychius* on, in U.S.A., 236.

—, — *racemosus* on, 236.

—, mycoses of, reclassification of, 630.

—, — *Mycotorula aegyptiaca* on, in Egypt, 584.

—, — *sinensis* on, in China, 696.

—, — *Paracoccidioides brasiliensis* on, 631; in Costa Rica, 169.

[Man], *Penicillium velutinum* on, in Holland, 471.

—, *Phialophora verrucosa* on, 100; in Uruguay, 509; in U.S.A., 509.

—, *Phoma hominis* on, in Italy, 510.

—, *Pityrosporum ovale* on, in U.S.A., 696.

—, *Posadasia capsulata* on, 100; as a type of mycosis, 631; cultural characters of, 445; occurrence in U.S.A., 446, 582; study on, 582.

—, *pyriformis* on, in U.S.A., (?) 235, 582, 760; referred to *Sepedonium*, 235, 760; renamed *Histoplasma pyriformis*, 760.

—, *Rhinosporidium seeberi* on, 100; as a type of mycosis, 631; occurrence in India, 446.

—, ringworms of, diagnosis of, 102.

—, *Scedosporium apiospermum* on, in Canada, 760.

—, *Scopulariopsis albo-flavescens* on, in Austria, 37.

—, — *atra* on, in Austria, 37.

—, — *blochi* on, in Hungary, 695.

—, — *brevicaulis* on, in Hungary, 104, 695.

—, — *fuscata*, *S. oidiostoma*, and *S. sphaerospora* on, in Austria, 37.

—, *Sepedonium* on, see *Posadasia pyriformis* on.

—, *Sporotrichum* on, in Costa Rica, 169.

—, — *beurmanni* on, in Algeria, 168; in Brazil, 759; in Japan, 309; (?) in U.S.A., 632; study on, 309.

—, — *schenkii* on, 100; in U.S.A., 36, 632.

—, *Torula* on, in Colombia, 758.

—, — (?) *histolytica* on, in U.S.A., 444.

—, *Trichophyton* on, as a type of mycosis, 631; control, 758; occurrence in Hungary, 104.

—, — *concentricum* on, 308; in India and the Orient, 35.

—, — *equinum* can infect, 103.

—, — *faviforme discoides* on, in Spain, 102.

—, — *glabrum* on, in Italy, 35.

—, — *gypseum* on, diagnosis of, by Wood's rays, 510.

—, — *granulosum* on, see *T. mentagrophytes* on.

—, — *indicum* on, 308.

—, — *interdigitale* on, in Manchukuo, 35; in U.S.A., 632.

—, — *mentagrophytes* on, in U.S.A., 632.

—, — *persicola* on, in Bulgaria, 35.

—, — *rubrum* on, in Jugo-Slavia, 632; in Manchukuo, 35.

—, — *sulphureum* on, in Morocco, 102.

—, — *tonsurans* on, in Costa Rica, 169.

—, — *tropicale* on, see *T. concentricum* on.

—, — *violaceum* on, in Italy, 35; in Manchukuo, 35; in Morocco, 102.

—, *Trichosporium pedrosoi* on, 100; as a type of mycosis, 631; occurrence in Brazil, Paraguay, and Porto Rico, 509.

—, yeasts on, in Hungary, 104.

Mandarin orange, see Orange.

Manganese deficiency in beet in Europe, 548; in Holland, 549.

[Manganese deficiency] in relation to grey speck of oats in Denmark, 265, 393.

— excess in barley, beet, cabbage, swedes, tobacco, weeds, and wheat in Germany, 404; in tobacco in U.S.A., 534.

— sulphate, use of, against grey speck of oats, 30, 121, 122, 677.

*Manginia ampelina*, pycnidial form of *Gloeosporium ampelophagum*, 617.

Mango (*Mangifera indica*), *Cercospora mangiferae* on, in Japan, 472.

—, *Cladosporium herbarum* on, in transit from India, 518.

—, *Diplodia natalensis* on, in Burma, 286.

—, *Dothiorella* on, in Burma, 286; in transit from India, 518.

—, (?) *Erysiphe cichoracearum* on, in S. Africa, 426.

—, *Fomes conchatus* on, in India, 193.

—, *Ganoderma applanatum* on, in Japan, 532.

—, *Gloeodes pomigena* on, in S. Africa, 426.

—, *Glomerella cingulata* on, *Gloeosporium mangiferae* conidial stage of, 518; occurrence in transit from India, 518; in U.S.A., 46.

—, *Helopeltis bergrothi* causing injury to, in Nyasaland, 14, 561.

—, *Penicillium* and *Phomopsis* on, and physiological disorders of, in transit from India, 518.

Mangold (*Beta vulgaris*), curly top of, in U.S.A., 339.

—, *Helicobasidium purpureum* can infect, 730.

—, magnesium deficiency disease of, in U.S.A., 645.

—, mosaic in Canada, 494.

—, *Pythium ultimum* can infect, 606.

—, see also Beet.

Mangosteen (*Garcinia mangostana*), *Diplodia natalensis* on, in Burma, 286.

Manihot dichotoma, *Oidium* on, in Ceylon, 146.

— *dulcis*, *M. palmata*, and *M. utilissima*, see Cassava.

Manila hemp, see *Musa textilis*.

Maple, see *Acer*.

Marasmoid threadblight on *Dipteryx odorata* in Trinidad, 256.

— on grapefruit in Trinidad, 627.

Marasmius on banana in Fiji, 45.

— on *Nephelium lappaceum* in Java, 153.

— on pepper in Borneo, 152.

— *bryocystis* on cacao in the British Empire, 87.

— *palmivorus* on oil palm in Malaya, 357.

— *perniciosus* on cacao, 224; control, 13; factors affecting, 13; history of, 430; note on, 566; occurrence in Brazil, 430; in the British Empire, 87; in British Guiana and Ecuador, 430; in Surinam, 155, 430; in Trinidad, 13, 430; varietal resistance to, 155.

— *scandens* on cacao in the British Empire, 87; in the Ivory Coast, 153.

— on coffee in the Ivory Coast, 153.

— *stenophyllus* on banana in the Gold Coast, 14; in the Ivory Coast, 154.

*Maravalia hyalospora* on *Acacia confusa* in Japan, 612; *Uromyces hyalosporus* synonym of, 612.  
 'Marbled fruit' of pineapple in Queensland, 216.  
*Margarine*, *Margarinomyces atrovirens* and *M. bubaki* on, in Holland, 471.  
*Marigold* (*Calendula officinalis*), celery virus 1 on, in U.S.A., 615.  
 Marrow, see Vegetable marrow.  
*Marrow-stem kale* (*Brassica oleracea* var. *acephala*), *Phoma lingam* on, resistance to, 558.  
 —, *Plasmodiophora brassicae* on, in Scotland, 557.  
 Marsh spot of peas, etiology of, 279, 280; occurrence in England, 279.  
*Marssonina* on barley in France, 424.  
 —, *Daphnes* on *Daphne mezereum* in Great Britain, 173, 492, 585.  
*Martynia diandra*, *Phytophthora parasitica* var. *piperina* can infect, 717.  
*Matthiola*, tomato spotted wilt affecting, in England, 763.  
 —, *incana*, 'breaking' of, in U.S.A., 172.  
 —, cauliflower virus can infect, 207.  
 —, *Phoma lingam* can infect, 547.  
 Mealy breakdown of apple in U.S.A., 592; bug wilt of pineapple, control, 643; occurrence in Haiti, 457; in Hawaii, 455, 457; (?) in Mauritius, 84; in the Philippines, 457, 643; *Pseudococcus brevipes* in relation to, 84, 455, 457, 643.  
 Measles of apple in New S. Wales, 348; in U.S.A., 349, 372; types of, 349, 372.  
 Meat, *Mucor* on, in England, 309.  
 —, *Penicillium flavo-glaucum* on, in relation to humidity, 633.  
*Medicago sativa*, see Lucerne.  
*Medlar* (*Mespilus germanica*), *Gymnosporangium globosum* on, in U.S.A., 368.  
 'Medullary necrosis' of potato in Holland, 252; potato 'rusty spot' renamed, 253.  
*Megalonectria pseudotrichia* ascigerous stage of *Stilbum cinnabarinum*, 459.  
*Melampsora euphorbiae* f. sp. *pepli* on *Euphorbia peplus*, albino form of, in Germany, 53.  
 —, *larici-caprearum* and *M. larici-populina*, receptive hyphae of, 464.  
 —, *lini* on flax, heterothallism in, 170, 309.  
 —, *pinitorda* on forest trees in Poland, 663.  
*Melampsoridium betulinum*, receptive hyphae of, 464.  
*Melanconium* on *Eucalyptus viminalis* in the Argentine, 223.  
*Melanops perseae* on avocado pear in S. Africa, 124; *Physalospora perseae* renamed, 124.  
*Melia azedarach*, *Ganoderma appianatum* on, in Japan, 532.  
 —, little leaf disease of, in U.S.A., 768.  
*Melilotus* mosaic, serological note on, 327.  
 —, *alba*, *Cercospora beticola* on, in U.S.A., 149.  
 —, —, *zebrina* on, in U.S.A., 195.  
 —, —, *Plenodomus meliloti* on, in Canada, 175.  
 [ *Melilotus alba* ], Pythiaceous fungus on, in U.S.A., 348.  
 —, *Pythium* on, in U.S.A., 588.  
 —, —, *Sclerotinia* on, in Canada, 175.  
 —, —, *sclerotiorum* on, in U.S.A., 638.  
 —, *indica*, *Cercospora zebrina* on, in U.S.A., 639.  
 —, —, *Sclerotinia sclerotiorum* can infect, 639.  
 —, *officinalis*, *Ascochyta lethalis* on, in U.S.A., 258.  
 —, —, *Plenodomus meliloti* and *Sclerotinia* on, in Canada, 175.  
 (?) *Meliola* on sugar-cane in the Argentine, 531.  
 —, *dubia*, *Cicinnobella ampullula* a parasite of, 793.  
*Meliolaceae*, list of, in the Philippines, 532.  
*Melon* (*Cucumis melo*), cucumber virus 4 can infect, 554.  
 —, damping-off of, in U.S.A., 671.  
 —, *Fusarium* on, in U.S.A., 812.  
 —, —, [*bulbigenum* var.] *niveum* on, in U.S.A., 419.  
 —, mosaic in U.S.A., 6, 811; transmission of, by seed, 6, 811; to squash, 6.  
 —, *Pythium aphanidermatum* can infect, 7.  
 —, —, *megalanthum* on, in France, 77.  
 —, *Verticillium albo-atrum* on, in U.S.A., 283.  
 —, —, *dahliae* on, in France, 77.  
*Membranosorus heterantherae* (?) identical with *Sorodiscus heterantherae*, 720.  
*Mentha* diseases in England, 414.  
 —, *arvensis*, *Puccinia menthae* on, in Estonia, 530.  
 —, *piperita*, see Peppermint.  
 —, *villoso-nervata*, *Puccinia menthae* on, in England, 791.  
 Meranin, use of, against *Actinomyces scabies* and *Spongopora subterranea* on potato, 330.  
 Mercuric chloride, as a constituent of calo-clor, 562; of sublimatoform, 572.  
 —, toxicity of, to *Ceratostomella pini*, 276; to fungi pathogenic to man, 584; to *Pseudomonas mors-prunorum*, 641.  
 —, use of, against *Actinomyces scabies* on potato, 55, 118, 528; against *Alternaria solani* on tomato, 535; against *Aplanobacter michiganense* on tomato, 535; against *Bacterium marginatum* on gladiolus 173; against *Bact. rhizogenes* on apple, 452; against *Bact. solanacearum* on potato, 790; against *Ceratostomella fimbriata* on sweet potato, 119; against *Corticium solani* on potato, 55, 118, 497, 527, 528, 607; against fruitlet black rot of pineapple, 182; against *Fusarium vasinfectum* on *Crotalaria juncea* and pigeon pea, 144; against mildew on paint coatings, 520; against *Penicillium gladioli* on gladioli, 173; against *Plasmodiophora brassicae* on cauliflower, 2; on cabbage and rape, 278; against rice diseases, 119; against *Sclerospora graminicola* on *Setaria italica*, 577; against *Venturia occulta* on

rye, 21; as a soil disinfectant, 460; in the preparation of mercury ammonium silicate dip, 173.

[Mercuric] cyanide, toxicity of, to fungi pathogenic to man, 584.

— oxide, use of, against *Actinomyces scabies* on potato, 118.

—, yellow, use of, against *Actinomyces scabies* and *Corticium solani* on potato, 150.

— salicylate, use of, against wheat bunt, 228.

Mercurochrome, effect of, on *Epidermophyton*, *Monilia*, *Saccharomyces*, and *Trichophyton*, 758.

Mercurous chloride as a constituent of calo-clor, 562.

— injury to cabbage and rape, 278.

—, use of, against *Actinomyces scabies* on potato, 118, 150; against *Bacterium marginatum* on gladiolus, 173; against *Penicillium gladioli* on gladiolus, 173; against *Corticium solani* on potato, 118, 150; against *Plasmiodiophora brassicæ* on cabbage and rape, 278.

Mercury, fungicidal activity of, 244.

— ammonium silicate, use of, against *Bacterium marginatum* and *Penicillium gladioli* on gladiolus, 173.

— compounds, use of, against cereal diseases, 380, 572; against *Corticium fuciforme* on turf, 587; in soil disinfection in U.S.A., 460.

—, organic, injury caused by to lettuce, 563.

—, —, toxicity of, to man, 707.

—, —, use of, against *Fusarium culmorum* and *Helminthosporium sativum* on barley, oats, and wheat, 688.

—, yellow oxide of, see Mercuric oxide, yellow.

Merthiolate, toxicity of, to *Trichophyton purpureum*, *T. rubrum*, and *Microsporong lanosum*, 695.

*Merulius lacrymans* on timber, action of, 68; control, 268, 542; factors affecting, 136, 267, 269; occurrence in England, 136; in Germany, 69, 542; in U.S.A., 137; in U.S.S.R., 267; specific resistance to, 136, 268; studies on, 136, 267, 268; viability of, 137, 267.

— *sylvester*, on timber, action of, 68.

*Mesolecanium deltae*, *Cephalosporium lecanni* on, in the Argentine, 98.

*Mespilus*, see Medlar.

Metals, action at a distance of, on *Ascochyta pisii*, *Penicillium glaucum*, and *Trichothecium roseum*, 646; on *Thielaviopsis basicola*, 647.

—, effect of, on fungicides, and vice versa, 597; on resistance of *Ricinus* to *Bacterium tumefaciens*, 647.

*Metarrhizium anisopliae* on *Balaninus caryae*, 429.

— on *Galleria mellonella* in France, 629.

— *brunneum* on a Cicadellid in the Philippines, 443.

Metol, experimental control of grey speck of oats by, 393.

Maig seed disinfection apparatus, 519.

*Microascus* on vine in Italy, 196; a constituent of *Dematophora glomerata*, 196.

*Microblastosporon*, not accepted as a genus, 193.

(?) *Micrococcus tritici* on rye and wheat in U.S.S.R., 297.

*Microlespedeza stipulacea* and *M. striata*, *Uromyces itoanus* on, in Manchuria, 516.

*Micropteltis bambusicola* synonym of *Phragmomyrium semiarundinariae*, 107.

*Microsphaera alni* var. *dentatae* on oak in China, 795; *M. dentatae* renamed, 795.

— *betae* on beet in Europe, 548.

(?) — *polonica* on hydrangea in S. Africa, 426.

— *querina* on oak in Austria, 406; in France, 190.

*Microsporon*, characters of, 101.

— on man, diagnosis of, 103.

— *audouini* can infect tomato, 405.

— on man, *Acrostalagmus cinnabarinus* in relation to, 695; occurrence in Germany, 102; in Hungary, 695; saltation in, 102; specific differentiation of, by Wood's rays, 510.

— var. *equinum*, synonym of *M. equinum*, 581.

— *canis*, *M. felineum* and *M. lanosum* synonyms of, 581.

— *equinum*, *M. audouini* var. *equinum* synonym of, 581.

— *felineum* on man in Costa Rica, 169.

— synonym of *M. canis*, 581.

— *ferrugineum*, *M. japonicum* identical with, 759.

— *japonicum* on man in Manchukuo, 35.

— *lanosum*, differentiation of, by Wood's rays, 510.

— synonym of *M. canis*, 581.

—, toxicity of merthiolate to, 695.

— *paraferrugineum* on man in Brazil, 760.

— *sapporoense* on man in Japan, 103.

*Microstroma album*, *Articulariella aurantiaca* synonym of, 408.

— *juglandis* on walnut in Germany, 204.

*Microxyphium*, cultural study on, 60.

Mildew of wool in France, 762.

*Milesia kriegeriana* on *Abies alba*, *A. concolor*, and *A. grandis*, life-history of, in England, 410.

— *polypodii* and *M. scolopendrii* on *Abies alba* and *A. concolor*, life-history of, in England, 410.

— *voegesiaca* on *Abies alba*, *A. concolor*, and *A. grandis* in England, 410.

Milk, *Bacterium bulgaricum*, *Geotrichum javanense*, and *Streptococcus lacticus* in, effect of, 328.

— of lime, use of, against *Bacterium solanacearum* on potato, 790. (See also Lime, hydrated.)

Mint, see *Mentha*.

Mites in relation to *Penicillium* on pineapple, 216.

—, transmission of *Ceratostomella ulmi* on elm by, in U.S.A., (?) 63, 476; of yeasts and fungi by, associated with *Ips* spp. on timber in U.S.A., 138.

Mitogenetic radiation as a criterion of the living nature of viruses, 133.

*Mitterella zizyphina* on *Zizyphus jujuba*, *Z. oenoplia*, and *Z. rotundifolia* in India, 700.

Mixed-virus streak of tomato, see Streak (mixed-virus) of tomato.

Molasses, use of, as an adhesive, 403.

Molybdcic acid, artifacts resembling intracellular bodies of tomato aucuba mosaic and Hy III virus induced by, 51.

*Momordica balsamina*, *Pythium aphanidermatum* can infect, 7.

*Monacrosporium* synonym of *Dactylella*, 509.

*Monilia*, industrial fermentation of pentosans by, 604.

— on fruit and vegetables in storage in U.S.A., 322.

(?) — on goats and sheep in Norway, 34.

— on man in Colombia, 758.

— on soy-bean cakes in Japan, 671.

—, serological reactions of, 34.

—, toxicity of cresol to, 758; of dyestuff, 758.

—, see also *Candida*.

— *capsulata* synonym of *Gilchristia [Endomycetes] dermatitidis*, 99.

— *cellulosophaga* on paper in France, 584, 698.

— *geophila* in butter in U.S.A., 237.

— *lustigi* in Italian leavens, 383.

— *oregonensis* on cherry and plum in Canada, 495.

*Moniliopsis* referred to *Rhizoctonia*, 278.

— *aderholdi* on cabbage in U.S.S.R., 278.

*Monilochaetes infuscans* on sweet potato in Brazil, 87.

(?) *Monochaetia* on *Chamaecyparis lawsoniana* in U.S.A., 205.

*Monosporium cactacearum* on *Mamillaria valida* in Italy, 765.

— *engelhardii* on man in Hungary, 695.

— *spinosum* on Italian and other leavens, 383.

— *tulanense* synonym of *Blastomyces dermatitidis*, 100.

*Monosporota parasitica* on peach in Italy, 774.

*Morphea citri* on coffee in the Cameroons, 31.

'Morte subita' of cacao in W. Africa, 566.

*Mortierella* in soil in Europe, 655; in Canada, 791.

*Morus*, see Mulberry.

Mosaic of *Acer negundo* in Bulgaria, 462.

— of almond in Bulgaria, 316, 368; in Czechoslovakia, England, Holland, and U.S.A., 368.

— of apple in Bulgaria, 316, 639; transmission of, to damson, 639; to pear, 316, 639; to quince, 639; to rose, 316.

— of apricot in Bulgaria, 316, 368; in Czechoslovakia, England, Holland, and U.S.A., 368; transmission of, to plum, 368.

— of *Arctium* in U.S.S.R., 108.

— of ash in Bulgaria, 462.

— of bean, breeding against, 148; 810; effect of, on transpiration, 385; occurrence in Brazil, 734; in France, 77,

286; in Japan, 4; in Tunis, 429; in U.S.A., 72, 148, 810; transmission of, by *Aphis rumicis*, *Macrosiphum pisi*, and *Myzus persicae*, 4; by needle, 4; by seed, (?) 77, 734; to peas and sweet peas, 4; varietal resistance to, 286, 734. (See also Bean viruses 1 and 2.)

[Mosaic] of beet in Belgium, 72, 342, 549; in Canada, 494; in England, 548; in France, 327; in Germany, 417, 808; in Holland, 549; physiology of, 808; properties of virus of, 342; serological studies on, 185, 327; study on, 342; transmission of, by *Myzus persicae*, 473; to tobacco, 473.

— of cabbage in U.S.A., 414; transmission of, by aphids and by juice, 415.

— of cassava in the Gold Coast, 146, 217; in Sierra Leone, 428; in Tanganyika, 146; transmission of, by Aleyrodidae, 146; varietal susceptibility to, 146, 217, 428.

— of celery in U.S.A., 498; transmission of, by *Aphis gossypii* and other aphids, 498. (See also Celery virus 1.)

— of cherry, control, 316; occurrence in Bulgaria, 316, 368; occurrence (?) in Canada, 494; in Czechoslovakia, England, Holland, and U.S.A., 368; transmission of, by budding, 368; to peach and plum, 368.

— of chilli in Denmark, 78; in U.S.A., 344; (?) virus of, affecting *Myosotis* in Denmark, 78.

— of *Commelina nudiflora* in Hawaii, 378; transmission of, to pineapple, 379.

— of *Cornus mas* in Bulgaria, 462.

— of *Corylus avellana* in Bulgaria, 462.

— of cowpea in British Guiana, 218.

— of crucifers in U.S.A., 731; transmission of, by *Brevicoryne brassicae* and *Myzus persicae*, 731. (See also Virus disease of *Brassica* spp.)

— of cucumber, adsorption and elution of virus of, 143; control, 811; occurrence in England, 811; in India, 143; in U.S.A., 245, 534; properties of virus of, 143, 554, 659; relation of, to potato veinbanding virus and Valleeau's tobacco virus 10729, 782; serological study on, 245, 385; studies on, 143, 245; transmission of, to cowpea, 635; to eggplant, 534; to *Nicotiana glutinosa*, 635; to *Phytolacca decandra*, 534; to *Primula sinensis*, 635; to *Solanum nigrum* and spinach, 534; to tobacco, 401, 473, 534, 635, 660; to tomato, 534; to *Zinnia elegans*, 473, 812; types of, 5, 245, 534, 554; virus of, affecting *Cynoglossum amabile*, *Lycopersicum pimpinellifolium*, *Nicandra physalodes*, *Phacelia whitlavia*, *Physalis heterophylla*, *P. longifolia*, *Solanum nigrum* var. *guineense*, tomato, and *Zinnia elegans* in U.S.A., 473; (?) *Primula obconica* in England, 635; tobacco in U.S.A., 685. (See also Cucumber viruses 1 and 3.)

— of dahlia in Brazil, 634.

— of elm and fig in Bulgaria, 462.

— of *Gladiolus* in Brazil, 634.

[Mosaic] of groundnut in Sierra Leone, 739; transmission of, by *Aphis laburni*, 739.  
 (?) — of hops in England, 423.  
 — of horse-radish in U.S.A., 731; similar to crucifer mosaic, 731; transmission of, to tobacco, 731.  
 — of lettuce in England, 730; transmission of, (?) by *Macrosiphum sonchi*, 730.  
 — of lilac in Bulgaria, 462; in Canada, 494.  
 — of lily in Brazil, 634; in Japan, 764.  
 — of mangold in Canada, 494.  
 — of *Melilotus*, serological note on, 327.  
 — of melon in U.S.A., 6, 811; transmission of, by seed, 6, 811; to squash, 6.  
 (?) — of *Musa textilis* in the Philippines, 311.  
 — of peas, included in 'St. John's disease', 613; incubation of virus in *Macrosiphum gei* and *M. pisi*, 415; occurrence in U.S.A., 415, 486; transmission of, by *M. gei*, 415; by *M. pisi*, 415, 486; to bean, clover, and sweet pea, 486. (See also Pea viruses 2 and 3.)  
 — of peach, control, 44, 222, 316; factors affecting, 319; occurrence in Bulgaria, 316, 368; in Czecho-Slovakia, England, and Holland, 368; in U.S.A., 44, 222, 318, 368; transmission of, by budding, 368.  
 — of pear in Bulgaria, 316, 639; transmission of, to apple, 316, 640.  
 — of *Petunia* in Japan, 699; transmission of, to tobacco, 699.  
 — of *Phaseolus* in Uganda, 82.  
 — of plum in Bulgaria, 316, 368; in Czecho-Slovakia, England, Holland, and U.S.A., 368; transmission of, by *Anuraphis padi*, 368; by budding, 368; to apple, 316; to cherry and peach, 368.  
 — of poplar in Bulgaria, 462.  
 — of potato, anatomical differentiation of, 116; control, 715, 784; effect of, on mycorrhiza, 602; on physiology of host, 52; on yield, 786; factors affecting, 786; method of diagnosing from the tuber, 388; occurrence in Austria, 464; in Belgium, 649; in Canada, 261, 605; in Estonia, 785; in France, 602; in Germany, 388, 650; in Irish Free State, 604; in Italy, 328, 781, 786; in New Zealand, 715; in Switzerland, 786; in U.S.A., 147, 496, 784; in U.S.S.R., 52, 116; relation of, to *Cestrum parqui* virus disease, 781; to pea mosaic virus 2, 782; to potato spot necrosis, 130; to potato streak, 116; to potato virus X, 261; transmission of, by *Aphis abbreviata*, 496; tuber indexing against, 147; types of, 116, 130, 464, 604, 605, 649, 782, 784; varietal resistance to, 147, 496.  
 — of *Prunus* spp. in Bulgaria, 316.  
 — of quince in Bulgaria, 316, 640.  
 — of raspberry, control, 218, 642; occurrence in Canada, 642; in U.S.A., 181, 218, 642; types of, 181, 218; varietal resistance to, 219; virus of, affecting bramble in U.S.A., 218.  
 — [Mosaic] of Rosaceae in Bulgaria, 316.  
 — of rose, control, 316; effect of, on bloom production, 171; occurrence in Bulgaria, 316; in U.S.A., 171, 363, 498; transmission of, by grafting, 363; to apple and pear, 316; varietal susceptibility to, 171.  
 — of rye in U.S.S.R., 493.  
 — of sorghum in U.S.A., 258.  
 — of soy-bean in Uganda, 82.  
 — of spinach in Germany, 671.  
 — of stone fruit in Bulgaria, 642.  
 — of sugar-cane, control, 530, 793; effect of, on yield, 191, 257, 394; legislation against, in Peru, 736; occurrence in the Argentine, 394; in Brazil, 718; in Dutch E. Indies, 743; in Hawaii, 530; in India, 80, 191, 257; in Java, 257; in Kenya, 427; in Peru, 736; in Porto Rico, 607; in Uganda, 793; in U.S.A., 123, 394, 718; in Venezuela, 397; serological tests with, 394; study on, 123, 191, 257; transmission of, by *Aphis maidis*, 743; types of, 123, 394; varietal resistance to, 257, 397, 607, 718, 743, 793.  
 — of swedes in Germany, 731; transmission of, by *Lygus pratensis* and sap, 732.  
 — of tobacco, artificial production of intracellular bodies of, 51; concentration of the virus of, 115, 197, 781, 798, 799; control, 335, 474, 658; cultivation of virus of, on tomato root tips, 127; cytological study on, 799; differentiation of viruses of, 61, 326, 685; factors affecting, 198, 199, 404, 474, 609; inheritance of ability to localize virus of, in chilli, eggplant, and *Nicotiana*, 126; masked strain of, 61; multiplication of virus of, in etiolated plants, 198; nature of virus of, 721; occurrence in Belgium, 260, 326; in French Indo-China, 126; in India, 198; in Madagascar, 335; in Queensland, 335; in Rhodesia, 474; in Sumatra, 473, 658; in Tanganyika, 60; in U.S.A., 61, 85, 126, 127, 197, 198, 199, 245, 260, 685, 724; overwintering of, 85, 685; properties of virus of, 61, 197, 198, 199, 260, 401, 402, 403, 659, 722, 782; purification of virus of, 402, 609, 721; relation of, to other viruses, 385; to tobacco leaf spotting, 260; to tobacco veinbanding, 677; to tomato severe etch virus, 782; to tomato streak, 201, 261; serological studies on, 245, 385, 782, 798; size of particles of, 401; spread of virus of, in *N. sylvestris*, 198; stream double refraction in relation to, 201, 521; studies on, 61, 126, 127, 197, 198, 199, 245, 260, 400, 782, 798, 799; transmission of, 685; to bean, 199, 474; to chilli, 198; to *N. glutinosa*, 127, 198, 199, 659, 721; to *N. langsdorffii*, 721; to *N. sylvestris*, 127, 198; to potato and tomato, 198; to *Zinnia elegans*, 812; types of, 61, 246, 260, 326, 385, 400, 474, 685; varietal resistance to, 401, 685. (See also Tobacco virus 1.)  
 — of tomato, control, 262; fern leaf type

of, 83, 108, 130, 218, 681; occurrence in British Guiana, 218; in Canada, 261; in Cyprus, 83; in England, 262; in Italy, 681; in U.S.A., 287; in U.S.S.R., 108; relation of, to tobacco virus 1, 130, 261; varietal susceptibility to, 218; virus of, (?) affecting *Arctium* in U.S.S.R., 108.

[Mosaic] of turnip in U.S.A., 731; transmission of, by *Brevicoryne brassicae*, *Myzus persicae*, and sap, 731; to cabbage, *Lycopersicum pimpinellifolium*, mustard, rape, spinach, and tobacco, 731.

— of vegetable marrow in Italy, 489; transmission of, by *Aphis gossypii* and by sap, 489.

— of wheat in Japan, 618; in U.S.S.R., 494.

— of *Zantedeschia ethiopica* in U.S.A., 587.

Mosquito, *Lagenidium giganteum* on, in U.S.A., 758.

Mottle of potato, see Potato, healthy potato virus.

— of tobacco, relation of, to potato latent virus, 261.

— leaf of citrus, control, 506; occurrence (?) in India, 81; in U.S.A., 506, 628; studies on, 302, 628.

— of orange, anatomical changes induced by, 506; control, 753; occurrence in S. Africa, 42, 753; in U.S.A., 506; in relation to mycorrhiza, 710.

Mottling of *Gleditschia triacanthos* and *Robinia pseudo-acacia* in Bulgaria, 462.

‘Moucheture’ of wheat in Algeria, 91.

Moulds, economic uses of, 52, 603, 604.

— nutritive value of, 603.

— on butter, control, 633, 762; factors affecting, 633, 761; occurrence in Canada, 633; in England, 761; in U.S.A., 236.

— on cacao, legislation against, in U.S.A., 14; occurrence in the British Empire, 87; in the Gold Coast, 14.

— on chestnuts in Italy, 801.

— on fruit (stored) in U.S.A., 322, 450; in England, 450.

— on grapes in Italy, 422.

— on groundnut, 213.

— on paper in France, 697.

— on pecan in U.S.A., 683.

— on *Robinia pseud-acacia* in U.S.A., 666.

— on vegetables (stored) in U.S.A., 322.

Mouldy core of apple in Canada, 591.

*Mucilago spongiosa* on grasses and other plants in Germany, 766.

*Mucor*, antagonism of, to *Ophiobolus graminis*, 689.

— in butter, 761.

— in soil in Europe, 655.

— on chestnuts in Italy, 801.

— on meat in England, 309.

— on plum in England, 641.

— on strawberry in U.S.A., 682.

— *abundans* on hay in U.S.A., 249.

— *botryoides* in soil in Alaska, Czechoslovakia, and Palestine, 655.

— *hiemalis* on beet, celery, and parsley in Europe, 655.

[*Mucor*] *javanicus* in the fowl in U.S.A., 694.

— *mucedo* in pharmaceutical preparations in Denmark, 115.

— *paronychius* can infect lemon, 236.

— — on man and orange in U.S.A., 236.

— *plumbeus* in butter in U.S.A., 237.

— *pusillus* on cattle in U.S.A., 511.

— *racemosus* can infect tomato, 405.

— — in pharmaceutical preparations in Denmark, 115.

— — in relation to mycorrhiza, 247.

— — in soil in Europe, 655.

— — on cabbage in Europe, 655.

— — on citrus, 236.

— — on lettuce in Europe, 655; soil *Mucorineae* in relation to, 655.

— — on man, 236.

— — on parsley in Europe, 655.

— — — toxicity of chemicals to, 115.

— *ramannianus* in relation to mycorrhiza, 247.

— — in soil in Europe, 655.

*Mucorineae* in soil in Canada, 791; in Europe, 655.

Mulberry (*Morus*), dwarf disease of, in Central Asia and Japan, 462.

— *Phleospora mori* on, in Italy, 265.

— *Phytophthora omnivorum* on, in U.S.A., 562.

*Musa cavendishii*, see Banana.

— *paradisiaca*, see Plantain.

— *sapientum*, see Banana.

— *textilis*, bunchy-top of, in the Philippines, 37.

— — diseases of, book on, 323.

— — *Helminthosporium torulosum* on, in the Philippines, 312.

— — (?) mosaic of, in the Philippines, 311.

Muscids, see Flies.

Mushrooms, *Cephalosporium costantinii* and *C. lamellaecola* on, in Great Britain, 346.

— *Chaetomium olivaceum* on, in Great Britain, 345.

— *Clitocybe dealbata* on, 739.

— *Coprinus atramentarius* in beds of, in Great Britain, 345.

— cultivation of, books on, 74, 213; in England, 74, 490; in France, 213, 555; in U.S.A., 616, 739; on artificial compost, 555; on plots treated with sodium chlorate, 616.

— *Dactylium dendroides* on, in Canada, Great Britain, and U.S.A., 346.

— *Fusarium solani* var. *martii* on, in England, 346, 615.

— moulds on stored, in U.S.A., 322.

— *Mycogone perniciosa* on, control, 345; effect of, on host, 674, 739; factors affecting, 555; occurrence in France, 490, 554, 739; in Great Britain, 346; studies on, 490, 554.

— *Myriococcum praecox* on, in Great Britain, 345; in U.S.A., 345.

— *Oospora fimicola* on, in Great Britain, 345.

— (?) *Papulaspora byssina* on, in England, 345; (?) identical with *Myriococcum praecox*, 345.

[Mushrooms], *Penicillium* on, in Great Britain, 346.  
 —, *Pseudobalsamia microspora* on, 739.  
 —, *Pseudomonas tolaasii* on, in Great Britain, 346; in U.S.A., 146.  
 —, 'rose comb' of, in Great Britain, 346.  
 —, spawn of, removal of the quarantine against, in Canada, 400.  
 —, *Verticillium* on, control, 345; factors affecting, 555; note on, 491; occurrence in France, 490, 554; in Great Britain, 346; study on, 346, 554.  
 —, *Xylaria vaporaria* on, control, 345, 555; notes on, 555, 739; occurrence in England, 555; in Great Britain, 346.  
 —, see also *Volvariella volvacea*.  
 Muskmelon, see Melon.  
 Mustard (*Brassica alba* and *B. nigra*), *Alternaria brassicae* (Berk.) Bolle on, in the Philippines, 140.  
 —, celery yellows can infect, 313.  
 —, turnip mosaic can infect, 731.  
*Myceliophthora* in eggs in France, 237.  
*Mycelium radicum nigrostrigosum* on *Abies*, beech, birch, *Carya*, hickory, *Corylus rostrata*, larch, and oak forming mycorrhiza in Sweden, 187.  
 —, — on pine forming mycorrhiza in Japan, Sweden, and U.S.A., 187.  
 —, — on *Pseudotsuga*, spruce, and *Tsuga* forming mycorrhiza in Sweden, 187.  
*Mycoderma*, a genus of the Torulopsidae, 193.  
 —, serological reaction of, 34.  
 —, *gilchristi* synonym of *Gilchristia dermatitidis*, 100. (See also *Endomyces dermatitidis*.)  
*Mycogone perniciosa* on mushrooms, control, 345; effect of, on host, 674, 739; factors affecting, 555; occurrence in France, 490, 554, 739; in Great Britain, 346; studies on, 490, 554.  
 Mycology, Bessey's text-book of, 708.  
 Mycorrhiza, culture chamber for the study of, 187.  
 — of *Abies*, beech, and birch, *Mycelium radicum nigrostrigosum* forming, in Sweden, 187.  
 — of *Burmannia candida* and *Epiphytanthus elongata*, Phycomycetoid fungus forming, in Java, 248.  
 — of cacao in Trinidad, 601.  
 — of *Calluna vulgaris*, asymbiotic germination of, in relation to, 247.  
 — of *Carya* and *Corylus rostrata*, 187.  
 — of cotton (Phycomycetoid endophyte) in the Sudan, 756.  
 — of *Epiphytanthus longata* in Java, 248.  
 — of larch and oak, *Mycelium radicum nigrostrigosum* forming, in Sweden, 187.  
 — of orange in U.S.A., 710.  
 — of pine in England, 410; *Armillaria matsutake* forming, in Japan, 284; *Mycelium radicum nigrostrigosum* forming, in Japan, Sweden, and U.S.A., 187.  
 — of potato in France, 602.  
 — of *Pseudotsuga*, spruce, and *Tsuga*, *Mycelium radicum nigrostrigosum* forming, in Sweden, 187.  
 — of *Vaccinium*, 247; *Mucorineae*, *Peni-*  
*cellium* and other saprophytes in relation to, 247.  
 [Mycorrhiza] of vine in relation to court-noué, 8.  
*Mycosphaerella* in the Arctic atmosphere, 461.  
 — *arbuticola* on *Arbutus menziesii* in U.S.A., 65.  
 — *areola* on cotton in U.S.A., 629.  
 — *bataticola* synonym of *M. ipomoeae*, 652.  
 — *brassicicola* on cabbage in India, 470.  
 — *citrullina* on cucumber in Trinidad, 182.  
 — *coffeicola* on coffee in the Cameroons, 31.  
 — *cruenta* ascigerous stage of *Cercospora cruenta*, 281.  
 — *dubia* on blackberry, dewberry, raspberry, and *Rubus* spp. in U.S.A., 775; perithecial stage of *Cercospora rubi*, 775.  
 — *fragariae* on strawberry in U.S.S.R., 595.  
 — *grossulariae* on gooseberry in U.S.A., 774.  
 — *ipomoeae* on sweet potato in U.S.S.R., 652; *M. bataticola* synonym of, 652.  
 — *pinodes* can infect *Phaseolus aconitifolius* and *P. aureus*, 614.  
 — on peas, control, 429; effect of, on physiology, 52; factors affecting, 428; notes on, 428, 613; occurrence in the Argentine, 15; in Japan, 547; in U.S.A., 428, 614, 683; in U.S.S.R., 52; overwintering of, 683.  
 — on vetch in U.S.A., 683.  
 — *pomi* on apple in U.S.A., 151.  
 — *rubi* on raspberry in U.S.A., 181, 685.  
 — *sentina* on pear, ascospore discharge of, 590; control, 590; factors affecting, 771; occurrence in Austria, 771; in England, 617; in Germany, 79; in Switzerland, 590; varietal susceptibility to, 79, 771.  
 — *tabifica*, *Phoma tabifica* [*P. betae*] pycnidial stage of, 282, 396.  
*Mycotorula aegyptiaca* on man in Egypt, 584; toxicity of dyes and metallic salts to, 583.  
 — *sinensis* on man in China, 696.  
 — *zeylanooides*, note on, 582.  
*Mycotoruleae*, culture of, 306.  
 —, distinction of, from Torulopsidae and *Saccharomyces cerevisiae*, 582.  
*Mycotoruloides*, use of, in control of wood-pulp fungi, 275.  
*Myelophilus piniperda* in relation to *Sphaeropsis ellisii* var. *chromogena* on pine, 727.  
*Myosotis*, chilli mosaic affecting, in Denmark, 78.  
 — *arvensis*, *Sclerotinia trifoliorum* on, in Sweden, 315.  
*Myriangium duriae* on *Aspidiota perniciosus* and *Chrysomphalus aurantii* in the Argentine, 98.  
*Myriococcum praecox* on mushrooms, (?) identical with *Papulaspora byssina*, 345; occurrence in Great Britain and U.S.A., 345.

*Myristica fragrans*, see Nutmeg.

*Myrothecium* (?) *roridum* on *Impatiens holstii* in Sierra Leone, 428.

*Myrtus communis*, *Pestalozzia* (?) *decolorata* on, in Cyprus, 84.

*Mystrosporium adustum* on *Iris reticulata* in Holland, 12.

*Myzus persicae*, transmission of beet mosaic by, to beet, 473; of broad bean mosaic by, 4; of crucifer and cucumber mosaics by, to tobacco, 473; of onion yellow dwarf by, in U.S.A., 51; of potato net-necrosis by, 233; of potato interveinal mosaic (one constituent) by, in Irish Free State, 605; of potato streak (bigarrure) by, in Belgium, 251; of potato virus Y by, to tobacco and other Solanaceae, 188, 246, 327; of potato yellow dwarf by, in U.S.A., 190; of tobacco 'pox' by, in Java, 533; of tobacco virus 1 by, 473; of turnip mosaic by, 731; of virus disease of cabbage, Brussels sprouts, and other *Brassica* spp. by, 669.

— *pseudosolani*, transmission of cucumber mosaic by, to tobacco by, 473; of narrow leaf virus disease of tomato by, 263; of tobacco virus 1 by, 473.

*Naemospora* on alder, *Corylus avellana*, poplar, and walnut in Cyprus, 742.

Naphthalene, use of, against *Phytophthora cactorum* on antirrhinum, 239.

—, sulphonated, use of, as a timber preservative, 730.

*Narcissus*, *Armillaria mellea* on, in England, 366.

—, *Botrytis narcissicola* on, in England, 366.

—, — *polyblastis* on, in England, 366; in Jersey, 637.

—, chlorosis in England, 366.

—, *Coleosporium narcissi*, *Cylindrocarpon radicicola* and *Fusarium bulbigenum* on, in England, 366.

—, grey stripe of, in England, 366.

—, *Penicillium* on, in England, 366.

—, physiological purple spot of, in England, 366.

—, *Puccinia schroeteri*, *Ramularia vallis-umbrosae*, *Rhizopus nigricans*, and *Rosellinia necatrix* on, in England, 366.

—, scale speck of, in England, 366.

—, *Stagonospora curtisii* and *Trichoderma viride* on, in England, 366.

—, yellow stripe of, in England, 366.

—,  $\times$  *Hippeastrum vittatum* hybrids, *Stagonospora curtisii* on, in U.S.A., 448.

*Nasturtium*, (?) *Oidiopsis taurica* on, in India, 561.

— *officinale*, see Watercress.

Necrosis of tobacco in England and S. Australia, 798.

Nectarine (*Prunus persica*), *Sclerotinia laxa* on, in Tasmania, 703.

Nectaromycetaceae, a family of the anascoporogenous yeasts, 192.

*Nectria* on beech and walnut in U.S.A., 663.

— *cacaoicola* on cacao in the Ivory Coast, 397; perithecial stage of *Fusarium decemcellulare*, 397.

[*Nectria*] *cinnabrina* on elm, 665.

— *coccinea* var. *sanguinella* on poplar in Germany, 478.

— *coffeigena* on coffee in the Cameroons, 31; perithecial stage of *Fusarium coffeicola*, 31.

— (?) *ditissima* on birch, lime tree, and oak in U.S.A., 338.

— — on poplar in Belgium, 478.

— *galligena* on *Acer rubrum* in U.S.A., 407.

— — on apple in England, 617.

— — on birch in U.S.A., (?), 338, 794.

— — on fruit trees, legislation against, in England, 336; in Germany, 736.

— — on *Hicoria glabra* in U.S.A., 407.

— (?) — on lime tree in U.S.A., 338.

— — on *Liriodendron tulipifera* in U.S.A., 407.

— — on oak in U.S.A., (?), 338, 407.

— — on poplar in U.S.A., 794.

— — on walnut in U.S.A., 407.

— *haematoxocca* on citrus in Java, 742.

— —, see also *Fusarium solani* var. *eumartii*.

— *rubi* on *Cyclamen persicum* in Germany, 585.

— *septomyxa* on *Cyclamen persicum* in Germany, 585.

'Needle fusion' disease of pine in New S. Wales and Queensland, 425.

Nekal A.E.M., composition of, and use of, as a stabilizer, 730.

— B X, composition of, and use of, as a timber preservative, 730.

Nematodes on cotton in India, 359; relation of, to *Fusarium vasinfectum*, 359.

— on cowpea in Cyprus, 742.

—, *Stylopage hadra* on, in U.S.A., 508.

—, see also *Anguillulina*, *Heterodera*, and *Hoploaimus*.

Nematographium, separation of, from *Graphium*, 703.

Nematospora, relation of, to *Eremothecium* and *Spermophthora*, 693.

— on cotton, *Dysdercus delauneyi* in relation to, 164; occurrence in St. Vincent, 164.

— *coryli* on *Centrosema plumieri* in the Belgian Congo, 507.

— — on citrus in U.S.A., 86.

— — on cotton, factors affecting, 358; notes on, 223; occurrence in the Belgian Congo, 223, 507; in Rhodesia, 358; in S. Africa, 97, 357; study on, 97; transmission of, by *Dysdercus nigrofasciatus*, 357; by *D. spp.* 358.

— — on cowpea, *Phaseolus lunatus*, and soy-bean in the Belgian Congo, 507.

— — on tomato in U.S.A., 86.

— *gossypii* can infect citrus and tomato, 86.

— — on *Centrosema plumieri* in the Belgian Congo, 507.

— — on cotton, factors affecting, 358; notes on, 223; occurrence in the Belgian Congo, 223, 507; in Rhodesia, 358; in S. Africa, 97, 357; study on, 97; transmission of, by *Dysdercus fasciatus*, 357.

*D. intermedius*, and *D. nigro-fasciatus*, 97, 358; by *D. superstitiosus*, 358.

[*Nematospora gossypii*] on cowpea, *Phaseolus lunatus*, and soy-bean in the Belgian Congo, 507.

*Nematosporangium*, culture medium for, 194.

— on barley and wheat in Japan, 498.

— *archenomane* referred to *Pythium archenomane* (q.v.), 95.

*Neocosmospora vasinfecta*, culture of, 327.

— on *Crotalaria juncea* and pigeon pea in India, 144.

*Neofabrea malicorticis* on pear in Holland, 12.

*Neomamillaria gulzowiana*, *Sporotrichum traversianum* on, in Italy, 765.

*Nephelium lappaceum*, *Marasmius* on, in Java, 153.

— *litchi*, *Pestalozzia*, unidentified fungus, and a yeast on, in S. Africa, 426.

*Nephrotettix apicalis* var. *cincticeps*, transmission of rice dwarf by, in Japan, 468.

*Nerium indicum*, *Cercospora nerii-indici* on, in Japan, 472.

— *oleander*, see *Oleander*.

Net necrosis of potato, attributed to potato leaf roll virus, 253.

Nettles (*Urtica*), tomato spotted wilt can infect, 201.

Neusaat-Grosstiller seed disinfection apparatus, 519.

*Nicandra physaloides*, bunchy top of tomato can infect, 800.

—, cucumber mosaic can infect, 473.

Nickel sulphide, use of, against *Fusarium culmorum* and *Helminthosporium sativum* on barley, oats, and wheat, 688.

*Nicotiana*, *Oidiopsis taurica* on, in Cyprus, 83.

—, tobacco mosaic on, inheritance of ability to localize virus of, 127.

— *affinis*, *Bacterium tabacum* can infect, 61.

— *glauca*, tobacco virus 6 can infect, 600.

—, tomato spotted wilt can infect, 404.

—, — streak can infect, 201.

— *glutinosa*, *Bacterium tabacum* can infect, 61.

—, —, celery virus 1 can infect, 5.

—, —, crucifer virus can infect, 669.

—, —, cucumber virus 1 (Porter's) can infect, 5, (?) 635.

—, —, potato virus 'D' can infect, 329.

—, —, — X can infect, 262; serological study on, 713.

—, —, *Primula* virus can infect, 635.

—, —, tobacco mosaic can infect, 127, 198, 199, 659, 721.

—, —, virus 1 on, influence of nitrogen on susceptibility to, 474.

—, —, virus 6 on, 600.

—, —, virus 10 on, in England, 797.

—, —, tomato spotted wilt can infect, 610.

—, —, streak can infect, 201.

—, —, virus 1 can infect, 261.

—, —, *langsdorffii*, *Bacterium tabacum* can infect, 61.

—, —, crucifer virus can infect, 669.

—, —, cucumber virus 1 can infect, 5.

[*Nicotiana langsdorffii*], tobacco mosaic protein can infect, 721.

— *longiflora*, *N. paniculata*, *N. rustica*, and *N. sanderae*, *Bacterium tabacum* can infect, 61.

— *sylvestris*, *Bacterium tabacum* can infect, 61.

—, tobacco mosaic can infect, 127, 198.

*Nigella damascena*, *Phytophthora* on, in U.S.A., 147.

*Nigrospora* on maize, factors affecting, 149, 751; occurrence in U.S.A., 149, 751; in U.S.S.R., 493.

— on sugar-cane in U.S.A., 57, 657.

— *musae* on banana in Australia, 517.

Nitrogen trichloride, use of, against citrus moulds, 628.

Nooksan of orange in Palestine, 31.

Nosperal, shading effect of, 79.

Nosperit, shading effect of, 79.

—, use of, against *Bacterium tabacum* on tobacco, 659.

Nosprasan, shading effect of, 79.

Nosprasit, shading effect of, 79.

— 'O', composition and use of, against *Venturia inaequalis* on apple, 701.

*Nucleophaga ranarum* on *Entamoeba ranarum* in France, 757.

Nutmeg (*Myristica fragrans*), *Coryneum myristicae* on, in Java and Sumatra, 152.

*Nymphaea alba*, *Pythium de Baryanum* on, in Sweden, 699.

Oak (*Quercus*), 'brown oak' disease of, attributed to *Fistulina hepatica*, 663; occurrence in England, 136, 413; in U.S.A., 663.

—, *Cronartium quercuum* on, in Italy, 680; in Japan, 533.

—, *Dothidea noxioides* on, *Fusicoccum noxioides* pycnidial stage of, 476; occurrence in Germany, 476.

—, *Fistulina hepatica* on, in U.S.A., 663; *Ptychogaster* stage of, 663.

—, *Gnomonia veneta* on, in U.S.A., 203.

—, *Microsphaera alni* var. *dentatae* on, in China, 795; *M. dentatae* renamed, 795.

—, — *quercina* on, in Austria, 406; in France, 190.

—, *Mycelium radicis nigrostrigosum* on, forming mycorrhiza in Sweden, 187.

—, *Nectria* (?) *ditissima* on, in U.S.A., 338.

—, — *galligena* on, in U.S.A., (?) 338, 407.

—, *Paecilomyces varioti* on, in U.S.A., 663.

—, *Poria subacida* on, in U.S.A., 805.

—, *Stereum gausapatum* on, in U.S.A., 663.

—, *Trabutia quercina* on, in Cyprus, 742.

Oats (*Avena*), *Alternaria* and *Bacillus avenae* on, in U.S.A., 219.

—, *Bacterium setariae* can infect, 156.

—, *Cercospora herpotrichoides* can infect, (?) 230, 503.

—, *Colletotrichum graminicolum* on, in Canada, 494, 574; *C. cereale* synonym of, 575.

—, *Corticium solani* on, in S. Australia, 559; resistance to, 603.

[Oats], *Dilophospora alopecuri* on, in Germany, 296.  
 — diseases, control in Kenya, 744.  
 —, *Fusarium* on, in France, 571.  
 —, — *culmorum* on, in Canada, 688.  
 —, *Gibellina cerealis* on, (?) in U.S.A., 26.  
 —, grey speck of, control, 29, 121, 122, 393, 575, 677; factors affecting, 121; manganese deficiency in relation to, 256, 393; occurrence in Denmark, 121, 393; in England, 677; in Germany, 575; in Holland, 29; in Western Australia, 122; studies on, 121, 393; varietal resistance to, 575.  
 —, *Helminthosporium avenae* on, in Northern Ireland, 558; in Scotland, 558, 690; in U.S.A., 219; *Pyrenophora avenae* ascigerous stage of, 515, 690.  
 —, — *sativum* on, in Canada, 688.  
 —, *Heterosporium avenae* on, in the Argentine, 15.  
 —, *Ophiobolus graminis* can infect, 503; occurrence on, in France, 570; in Germany, 157.  
 —, *Puccinia* on, sporulation in, 52.  
 —, — *agropyri* can infect, 501.  
 —, — *graminis* on, factors affecting, 225, 350, 687; genetics of resistance to, 434; occurrence in Canada, 225; in U.S.A., 350, 434; in U.S.S.R., 18; studies on, 225, 687; varietal resistance to, 350, 573.  
 —, — *loli* on, breeding against, 148; control, 18; effect of, on physiology of host, 220, 300, 353, 567, 625; on yield, 353, 625; factors affecting, 53, 747; genetics of resistance to, 434; losses caused by, 18; method of estimating losses caused by, 291; occurrence in Canada, 149; in Kenya, 427; in Mexico, 149; in U.S.A., 148, 149, 220, 353, 434, 435, 567, 625; in U.S.S.R., 18, 291; physiological forms of, 149, 220, 292, 435; sporulation in, 53; varietal resistance to, 18, 435.  
 —, 'pupation' disease of, in U.S.S.R., 493.  
 —, *Pyrenophora avenae* on, in Scotland, 690; perithecial stage of *Helminthosporium avenae* (q.v.), 515, 690.  
 —, reclamation disease of, control, 160, 255; notes on, 160; occurrence in Germany, 160, 255, 256; varietal resistance to, 255.  
 —, *Ustilago avenae* on, breeding against, 148, 573; control, 20, 21, 159, 380, 382, 572, 573, 620, 745; effect of, on yield, 573; genetics of resistance to, 29, 231, 573, 574; hybridization of, with *U. koller*, 29, 573; method of detecting, in host tissues, 746; occurrence (?) in the Argentine, 29; in Australia, 88; in Canada, 745; in Germany, 20, 231, 620; in India, 160; in New S. Wales, 573; in Queensland, 572; in Rumania, 436; in Sweden, 21; in U.S.A., 29, 148, 382, 497, 573, 574; physiologic forms of, 436, 574; seedling lesions caused by, 88; studies on, 29, 231, 436, 573, 574; varietal resistance to, 231, 436, 497, 573, 574.  
 [Oats, *Ustilago*] *koller* on, breeding against, 573; control, 159, 160, 382, 572, 573, 745; effect of, on growth, 436; on yield, 436, 573; factors affecting, 436; genetics of resistance to, 29, 573; hybridization of, with *U. avenae*, 29, 573; occurrence in the Argentine, 29; in Canada, 745; in India, 160; in New S. Wales, 573; in Queensland, 572; in U.S.A., 29, 382, 436, 573; studies on, 29, 436, 573; varietal resistance to, 573.  
 —, white spotting of, in Germany, 572.  
 —, *Wojnowicia graminis* on, in U.S.A., 569.  
 Ob 21, use of, against *Plasmopara viticola* on vine, 79.  
 Obranit, use of, against reclamation disease of cereal and other crops, 575.  
*Ochropsora sorbi* on *Anemone nemorosa*, *Prunus*, and *Pyrus* in England, 492.  
*Oeceticus geyeri*, *Sporotrichum globuliferum* and *S. paranense* on, in the Argentine, 98.  
*Oidiendendron*, differentiation of, from *Hyalodendron*, 70.  
 — *fuscum*, *O. griseum*, and *O. nigrum* on woodpulp in Sweden, 275.  
*Oidiopsis taurica* on chilli in Ceylon, 146.  
 — on *Foeniculum* and lucerne in Cyprus, 83.  
 (?) — on nasturtium and *Trigonella foenum-graecum* in India, 561.  
 — on *Nicotiana* and tomato in Cyprus, 83.  
*Oidium* on bean in Brazil, 734.  
 — on fruit (stored) in U.S.A., 322.  
 — on hydrangea in Ceylon, 146.  
 — on *Kalanchoe blossfeldiana* in Germany, 637.  
 — on *Piper betle* in Burma, 286.  
 — on potato in Cyprus, 742.  
 — on vegetables (stored) in U.S.A., 322.  
 (?) *balsamii* on *Phaseolus aureus* in Ceylon, 146.  
 — *begoniae* on begonia in Germany, 447.  
 — *calanchoeae* on *Kalanchoe* in Germany, 586.  
 — *dermatitidis* synonym of *Gilchristia* [*Endomyces*] *dermatitidis*, 100.  
 — *heveae* on *Hevea* rubber, control, 331, 654, 657, 743, 791; factors affecting, 331, 791; occurrence in Ceylon, 654, 657; in Java, 152, 743; in Malaya, 331, 791.  
 — *manihotis* on *Manihot* spp. in Brazil, 87.  
 — *tingitaninum* on citrus in Java, 153.  
 Oil, use of, with coposil, 151.  
 —, anthracene, use of, with Bordeaux mixture, 594.  
 — copper spray, use of, against *Phragmidium* on rose, 638; against *Sphaerotheca pannosa* on rose, 638, 644. (See also Palustrex.)  
 —, fuel, and creosote, use of, as a timber preservative, 484, 485.  
 —, gas, use of, for killing diseased bananas, 13.  
 — paraffin mixture, use of, against soft scald of apples, 41.

[Oil], petroleum, use of with lime-sulphur, 701.

—, pine-tar, a constituent of palustrex, 519.

— sprays, use of, against *Bacterium juglandis* on walnut in U.S.A., 477.

Oil palm (*Elaeis guineensis*), *Achromobacter* and *Bacillus mesentericus* group on, in Malaya, 31.

—, bacterial bud rot of, in Malaya, 357.

—, bunch-end rot of, in Malaya, 357.

—, charcoal base rot of, in Malaya, 81.

—, crown disease of, in Malaya, 357.

—, *Flavobacterium* (?) *diffusum* on, in Malaya, 31.

—, *Fomes lignosus* on, in Malaya, 357.

—, — *noxius* on, in Malaya, 81, 357.

—, fruit rot of, in Malaya, 31, 357.

—, *Fusarium* on, in Malaya, 31.

—, *Ganoderma applanatum* and *G. lucidum* on, in W. Africa, 578.

—, lightning injury to, in Malaya, 357.

—, *Marasmius palmivorus* on, in Malaya, 357.

—, *Ustulina zonata* on, in Malaya, 357.

Oiled wraps, use of, against apple scald, 42, 770.

*Olea europaea*, see Olive.

*Oleander* (*Nerium oleander*), *Bacterium tumefaciens* can infect, 686.

—, *Omphalia flava* can infect, 184.

—, *Pseudomonas savastanoi* var. *nerii* on, in U.S.A., 686.

Oleocellosis of orange in Italy, 356; in S. Africa, 755.

Olive (*Olea europaea*), *Bacterium tumefaciens* can infect, 686; legislation against, in Egypt, 544.

—, *Cycloconium oleaginum* on, in Cyprus, 706.

—, *Gloeosporium olivarum* on, in Japan, 596.

—, *Glomerella cingulata* can infect, 596.

—, *Macrophoma dalmatica* on, in Cyprus, 83.

—, *Pseudomonas savastanoi* on, in Cyprus, 706; in U.S.A., 643, 686.

—, — var. *nerii* can infect, 686.

—, sooty mould of, in Cyprus, 706.

—, *Sphaeropsis dalmatica* on, in Cyprus, 706.

—, wilt in Italy, 680.

*Olpidium majus* on cucumber in Wales, 489.

—, *nematodae* on *Heterodera schachtii* in Czecho-Slovakia, 33.

*Omphalia flava* can infect *Bryophyllum calycinum*, ferns, *Ficus*, oleander, and *Plumbago capensis*, 184.

—, on coffee in Venezuela, 397; studies on, 184.

Onion (*Allium cepa*), *Aspergillus niger* on, 553.

—, *Bacterium formosanum* can infect, 738.

—, *Botrytis* on, in Germany, 553.

—, — *allii* on, in Poland, 49; toxicity of phenolic compounds to, 556.

—, celery virus 1 on, in U.S.A., 615.

—, *Colletotrichum circinans* on, toxicity of phenolic compounds to, 556.

[Onion] diseases, control, 277.

—, *Fusarium [vasinfectum var.] zonatum* on, in U.S.A., 150.

—, *Gibberella saubinetii* on, 553.

—, *Peronospora schleideni* on, in England, 488; in U.S.A., 417.

—, *Phoma terrestris* on, in U.S.A., 150.

—, *Puccinia allii* or *P. porri* on, in Japan, 735.

—, purple blotch of, in U.S.A., 222.

—, 'Rotzkrankheit of', in Germany, 553.

—, *Sclerotium cepivorum* on, in Germany, 553.

—, — *rolfsii* on, in the Philippines, 315.

—, *Urocystis cepulae* on, legislation against, in Egypt, 544.

—, yellow dwarf of, in U.S.A., 51, 810; transmission of, by aphids, *Aphis rumicis*, and *Myzus persicae*, 51.

*Oospora canina*, see *Achorion caninum*.

—, *citr-aurantii* on citrus in Sierra Leone, 428.

—, *fimicola* on mushrooms in Great Britain, 345.

—, *lactis* in butter, 761; in U.S.A., 237.

—, *pustulans* on potato in New Zealand, 466.

*Ophiobolus*, taxonomy of, 124.

—, *fulgidus* on *Ambrosia trifida* in U.S.A., 125; *Phoma* stage of, 125.

—, *graminis* can infect *Bromus schraderi*, *Hordeum*, maize, oats, rye, *Setaria italica*, sorghum, and wheat, 503.

—, — on *Agropyron cristatum*, *A. repens*, and *A. tenerum* in Canada, 622.

—, — on barley, control, 621; factors affecting, 157, 621; occurrence in England, 621; in France, 570; in Germany, 157; study on, 157.

—, — on *Bromus inermis* in Canada, 622.

—, — on cereals, control, 622; occurrence in Algeria, 26; in Canada, 622; in France, 26; in Germany, 351; in Morocco, 26.

—, — on grasses in Canada, 622; in Holland, 12.

—, — on oats in France, 570; in Germany, 157.

—, — on rye in Germany, 157.

—, — on wheat, antagonism of soil organisms to, (?) 157, 689; control, 157, 230, 351, 497, 621, 689; factors affecting, 157, 230, 351, 352, 424, 433, 497, 621, 689; losses caused by, 622; notes on, 502, 748; occurrence in Belgium, 679; in Canada, 748; in England, 621; in France, 424, 502, 570; in Germany, 157, 229, 351; in Kenya, 427; in New S. Wales, 622; in Sweden, 352; in U.S.A., 497; study on, 157.

—, *halimus* on *Zostera marina* in (?) Denmark, 50, 326; in England, Ireland, and N. America, 50; (?) in Norway and Sweden, 326; in U.S.A., 599; studies on, 50, 326; *O. maritimus* in relation to, 50.

—, *herpotrichus* on *Agropyron repens* in U.S.A., 124.

—, — on cereals in France, Germany, Holland, and Italy, 124.

[*Ophiobolus herpotrichus*] on wheat in Sweden, 352.  
 — —, see also *Hendersonia herpotricha*.  
 — *heterostrophus* renamed *Cochliobolus heterostrophus*, 125.  
 — *maritimus*, relation of, to *O. halimus*, 50.  
 — *merolinense*, *Ceratostomella merolinensis* renamed, 274.  
 — *miyabeanus* on rice, control, 468; factors affecting, 653; *Helminthosporium oryzae* conidial stage of, 529; histological study of, 529; occurrence in Indo-China, 468; in Japan, 529, 653; in U.S.A., 221; pseudomyceliolysis in, 528.  
 — *oryzinus*, systematic position of, 124.  
*Ophiocordyceps unilateralis* in British Guiana and Ceylon, 443; *Hirsutella formicarum* conidial stage of, 443.  
*Ophiiodothella vaccinii* on *Vaccinium arboreum* in U.S.A., 135.  
*Ophiostoma brevirostrata* and *longirostrata* sections of, 274.  
 —, *Graphium* retained as a genus for conidial forms of, 703.  
 —, *Hyalodendron* believed to be Mucedinaceous form of, 703.  
 (?) — on wood pulp in Scandinavia, 545.  
 — *adiposum*, *Ceratostomella adiposa* renamed, 274.  
 — *canum*, *Ceratostomella cana* renamed, 274.  
 — *castaneae*, *Ceratostomella castaneae* renamed, 274.  
 — *catonianum* on apple in Italy, 374.  
 — — on pear in Italy, 373, 702; *Graphium pirinum* and *Hyalodendron pirinum* imperfect forms of, 702.  
 — *coerulescens*, *Endoconidiophora coerulescens* renamed, 274.  
 — *coeruleum*, *Ceratostomella coerulea* renamed, 274.  
 — — on wood pulp in Sweden, 274.  
 — *exiguum*, *Ceratostomella exigua* renamed, 274.  
 — *fagi*, *Ceratostomella fagi* renamed, 274.  
 — *fimbriatum*, *Ceratostomella fimbriata* renamed, 274.  
 — *ips*, *Ceratostomella ips* renamed, 274.  
 — *lignorum*, *Ceratostomella lignorum* renamed, 703.  
 — *majus*, *Ceratostomella major* renamed, 703.  
 — *merolinense*, *Ceratostomella merolinensis* renamed, 274.  
 — *minus*, *Ceratostomella minor* renamed, 274.  
 — *paradoxum*, *Ceratostomella paradoxa* renamed, 274.  
 — *piceae*, *Ceratostomella piceae* renamed, 274.  
 — — on wood pulp in Sweden, 274.  
 — *piliferum*, *Ceratostomella pilifera* renamed, 274.  
 — *pini*, *Ceratostomella pini* renamed, 274.  
 — *pluriannulatum*, *Ceratostomella plurianulata* renamed, 274.

[*Ophiostoma*] *quercus*, *Ceratostomella quercus* renamed, 274.  
 — *stenoceras*, *Ceratostomella stenoceras* renamed, 274.  
 — — on wood pulp in Sweden, 274.  
 — *ulmi*, *Ceratostomella ulmi* renamed, 274.  
*Ophiostomella*, *Chaetoceratostoma* referred to, 703.  
 — *pirina*, *Ceratostoma pirinum* referred to, 703.  
*Opuntia keyensis*, *Bacterium tumefaciens* can infect, 39.  
*Orange* (*Citrus aurantium*, *C. sinensis*, &c.), *Alternaria* on, in the Argentine, 15.  
 —, *Bacillus mesentericus vulgaris* on, in Italy, 356.  
 —, brown markings on, from Portuguese E. Africa and S. Africa, 754.  
 — — spot, suggested virus nature of, 505.  
 —, *Cladosporium* on, in the Argentine, 15.  
 —, *Colletotrichum gloeosporioides* on, control, 315; method of infection by, 692; occurrence in the Argentine, 15; in U.S.A., 578; in Western Australia, 315.  
 —, *Diaporthe* can infect, 96.  
 —, — *citri* on, control, 161; occurrence in the Argentine, 15; in New S. Wales, 161; in Rhodesia, 427, 678; in Uruguay, 15; in U.S.A., 564; *Phomopsis citri* imperfect stage of, 15.  
 —, *Diplodia* can infect, 564.  
 —, — *natalensis* on, control, 30, 86; mixed inoculations with, 577; occurrence in Palestine, 30, 577; in U.S.A., 86, 564.  
 — diseases, control, in Morocco, 517; legislation against, in Spain, 480.  
 —, frenching of, in U.S.A., 441, 481.  
 —, *Fusarium* on, in Italy, 692.  
 —, — (?) *diversisporum* on, in Rhodesia, 427.  
 —, — *lateritium* on, in Cyprus, 83.  
 —, — (?) var. *majus*, *F. (?) moniliiforme* var. *erumpens*, *F. orthoceras*, *F. oxysporum*, and *F. solani* on, in Rhodesia, 427.  
 —, *Ganoderma applanatum* on, in Japan, 532.  
 —, *Gloeodes pomigena* on, in S. Africa, 754.  
 —, *Gloeosporium* (?) *limetticolum* on, in Ceylon, 146.  
 —, *Glomerella cingulata* can infect, 40.  
 —, infectious chlorosis of, in Algeria, 505.  
 —, *Lambertella corni-maris* can infect, 451.  
 —, *Limacinia citri* on, legislation against, in Spain, 480.  
 —, low temperature breakdown of, from S. Africa, 754.  
 —, 'mal di gomma' of, in Venezuela, 398.  
 —, mottle leaf of, anatomical changes induced by, 506; control, 753; occurrence in S. Africa, 42, 753; in U.S.A., 506; relation of, to mycorrhiza, 710.  
 —, *Mucor paronychius* on, in U.S.A., 236.  
 —, mycorrhiza of, in U.S.A., 710.

[Orange], nooksan (physiological breakdown) of, in Palestine, 31.  
 — oleocellosis in Italy, 356; in S. Africa, 755.  
 —, *Penicillium* on, from Cyprus, 742.  
 —, *digitatum* on, control, 30, 96, 321, 506; factors affecting, 30, 441, 506; method of testing susceptibility to, 441; mixed inoculations with, 30, 577; occurrence in Palestine, 30, 506, 577; in S. Africa, 96, 440, 441; in U.S.A., 578; to rind breakdown, 578; study on, 30, 96.  
 —, *italicum* on, control, 30, 506; factors affecting, 30, 506; mixed inoculations with, 30; occurrence in Palestine, 30, 506; in U.S.A., 578; relation of, to rind breakdown, 578; study on, 30.  
 —, *Phomaciticarpa* on, in Queensland, 216.  
 —, *Phytophthora* on, in Italy, 680, 692.  
 —, *citrophthora* on, in Rhodesia, 427, 678.  
 —, *parasitica* on, in Java, 301.  
 —, *Poria friesiana* on, in Cyprus, 83.  
 — psoriasis, study on, 627.  
 —, *Pythium de Baryanum* and *P. (?) megalacanthum* on, in Italy, 680.  
 —, rind breakdown of, in U.S.A., 578.  
 —, — spot of, in U.S.A., 233.  
 —, *Rosellinia* on, in St. Lucia, 84.  
 —, *Septobasidium alni* on, in Venezuela, 398.  
 —, *Sphaceloma faucettii*, see *Sporotrichum citri* on.  
 —, — var. *viscosa* on, intercepted in U.S.A. from Brazil, 816.  
 —, *Sporotrichum citri* on, control, 84, 218, 742; occurrence in British Guiana, 218; in Java, 742; in Sierra Leone, 428; in St. Lucia, 84; (?) in U.S.A., 348; in Venezuela, 398.  
 —, *Trichoderma lignorum* on, 163; in Rhodesia, 427.  
 —, xyloporosis of, in Palestine, 162.  
 —, water spot of, in U.S.A., 578.  
 'Original Gun' dusting machine, 214.  
*Ornithogalum fimbriatum* and *O. narbonense*, *Puccinia anomala* can infect, 292.  
*Ornithopus sativus*, reclamation disease of, in Germany, 255.  
*Orphella*, note on, 630.  
*Oryza sativa*, see Rice.  
*Osmium*, fungicidal activity of, 244.  
*Othia deformans* synonym of *Aloysiella deformans*, 333.  
*Oxalic acid*, production of, by *Aspergillus*, 604.  
*Oxalis corniculata*, *Puccinia maydis* can infect, 292.  
 — var. *atropurpurea*, *Puccinia maydis* on, 438.  
*Oxy-acetylene* charring process for timber preservation, 806.  
*Pachybasium candidum* on strawberry in England, 180.  
*Paecilomyces varioti* on oak in U.S.A., 663.  
*Paederia chinensis*, *Puccinia zoysiae* on, *Aecidium paederiae* identical with, 796; occurrence in Japan, 796.  
*Paeonia*, see Peony.  
*Pahala* blight of sugar-cane in Hawaii, 531.  
 Paint, lead, *Phoma pigmentivora* causing discoloration of, in England, 137.  
 —, —, use of, as a wound dressing, 567.  
*Paliurus ramosissimus*, *Phakopsora zizyphi-vulgaris* on, in Japan, 719.  
*Palmyra* palm (*Borassus flabellifer*), *Phytophthora palmivora* on, in India, 122.  
*Palustrex*, composition and use of, as a fungicide, 519.  
*Panax quinquefolium*, see Ginseng.  
*Pancratium maritimum*, *Stagonospora curtissii* can infect, 448.  
*Panicum autumnale*, *Phyllosticta sorghina* on, 57.  
 — *colonum*, *Sclerotium hydrophilum* on, in U.S.A., 222.  
 — *crus-galli*, *Sclerotium fumigatum* on, in Japan, 652.  
 —, — *hydrophilum* on, in U.S.A., 222.  
 — *frumentaceum*, *Helminthosporium leucostylum* and *H. nodulosum* can infect, 440.  
 — *maximum*, *Phyllosticta sorghina* on, 57.  
 — *sanguinale*, *Piricularia oryzae* on, 529.  
 —, — *Puccinia tubulosa* on, in the Philippines, 608.  
 —, — *Sclerotium* on, in U.S.A., 221.  
 — *trypheron*, *Sclerospora sorghi* on, in India, 80.  
 — *variegatum*, *Catenaria* on, in U.S.A., 259.  
*Pansy* (*Viola tricolor*), curly top of, in U.S.A., 339.  
 —, *Pythium de Baryanum* on, in Germany, 38.  
 —, *Sphaceloma violae* on, in New S. Wales and U.S.A., 764.  
*Panus stipticus* on timber in U.S.S.R., 270.  
*Papaver*, tomato spotted wilt can infect, 404.  
 — *nudicaule*, tomato spotted wilt on, in Western Australia, 129.  
*Papaw* (*Carica papaya*), *Ascochyta caricae* on, in Queensland, 216.  
 —, *Asperisporium caricae* on, in U.S.A., 46.  
 —, *Fusarium dimerum* var. *pusillum* on, in Trinidad, 182.  
 —, *Gloeosporium* on, in Queensland, 216; in Trinidad, 182.  
 —, *Macromphoma phaseoli* on, in Sierra Leone, 428.  
 —, *Phomopsis papayae* on, in Trinidad, 182.  
 —, *Phytophthora* and *Sphaerotheca* on, in Queensland, 216.  
 —, virus disease of, in Burma, 286.  
 —, yellow crinkle of, in Queensland, 216.  
*Paper*, *Actinomyces celluloseae*, *Aspergillus fumigatus* var. *cellulosae*, and *Cladosporium herbarum* var. *cellulosae* on, in France, 584, 697.  
 —, *Fusarium coeruleum* on, in France, 697.  
 —, — var. *cellulosae* on, in France, 584.

[Paper], *Monilia cellulosophaga* on, in France, 584, 698.  
 —, *Stachybotrys* on, in France, 698.  
 (?) *Papulaspora byssina* on mushrooms in Great Britain, 345; (?) identical with *Myriococcum praecox*, 345.  
*Paracoccidioides brasiliensis* on man, 631; in Costa Rica, 169.  
 Paradichlorobenzene as a constituent of uni-dea, 114.  
*Paradiplodia aurantiorum* identical with *Botryodiplodia lecanium*, 793.  
 Paranitrophenol, use of, against wood-pulp fungi, 275.  
*Paratriozia cockerelli* transmitting potato psyllid yellows in U.S.A., 117.  
*Parendomyces-Trichosporon* group, relation of *Reduallia* to, 170.  
*Parinarium mobola*, *Armillaria mellea* on, in Nyasaland, 14.  
 Paris green dust, use of, against wheat bunt, 22.  
 Parsley (*Petroselinum sativum*), beet curly top affecting, in U.S.A., 171.  
 —, *Mucor hiemalis* and *M. racemosus* on, in Europe, 655.  
 Parsnip (*Pastinaca sativa*), *Helicobasidium purpureum* can infect, 730.  
 —, *Lambertia corni-maris* can infect, 451.  
*Passiflora macrocarpa*, see Granadilla.  
*Patellina epimyces* on *Hirsutella entomophila* and *H. versicolor*, 443.  
*Pavetta*, bacterial nodules of, 154.  
 P-D-7, use of, against (?) *Pythium* and *Rhizoctonia* on spinach, 563.  
 Peach (*Prunus persica*), *Bacterium* spp. from apple and plum can infect, 319.  
 —, — *pruni* on, control, 682; occurrence in Brazil, 87; in U.S.A., 178, 682.  
 —, — *tumefaciens* can infect, 111; occurrence in Italy, 680.  
 —, *Chalaropsis thiellaviooides* on, comparison of, with allied forms, 408; occurrence in England, 801.  
 —, chlorosis in S. Africa, 319.  
 —, *Ciboria aestivalis* on, in New S. Wales, 764.  
 —, *Cladosporium carpophilum* on, in Canada, 44; in U.S.A., 683.  
 —, *Clasterosporium carpophilum* on, in France, 594.  
 —, *Coniothyrium* on, in Canada, 44, 177.  
 —, *Cytospora cincta* on, see *Valsa cincta*.  
 —, — *persicae* on, in Italy, 450.  
 —, diseases, control in Morocco, 517; in U.S.A., 768.  
 —, *Fusarium avenaceum* (= *F. herbarum* f. 1) on, in Italy, 454.  
 —, — *poeae* on, in Italy, 454.  
 —, *Glomerella cingulata* can infect, 40.  
 —, little leaf of, control, 176, 767, 768; 'corral spot sickness' may be identical with, 767; factors affecting, 449; occurrence in U.S.A., 176, 449, 767, 768; relation of, to *Sclerotinia laza*, 449, 642.  
 —, — peach disease of, in U.S.A., 219, 682, 704; transmitted by *Macropsis trimaculata*, 682, 704; virus of, affecting plum, in U.S.A., 682, 705; *Prunus salicina* in U.S.A., 705.  
 [Peach], *Monotospora parasitica* on, in Italy, 774.  
 —, mosaic, control, 44, 222, 316; factors affecting, 319; occurrence in Bulgaria, 316, 368; in Czecho-Slovakia, England, and Holland, 368; in U.S.A., 44, 222, 318, 368; transmission of, by budding, 368.  
 —, *Phoma persicae* on, in the Argentine, 15.  
 —, phony disease of, in U.S.A., 64, 374.  
 —, physiological breakdown of, in U.S.A., 773.  
 —, — disease of, in Egypt, 177.  
 —, plum yellows can infect, 682, 704.  
 —, *Pseudomonas mors-prunorum*, *P. papulans*, *P. prunicola*, and *P. syringae* can infect, 319.  
 —, red suture of, in U.S.A., 219; (?) transmission of, by *Macropsis trimaculata*, 498.  
 —, rosette in U.S.A., 219, 374.  
 —, *Sclerotinia fructicola* on, in Australia, 43, 559; in Canada, 594.  
 —, — *laza* on, control, 594, 703; occurrence in France, 594; in Tasmania, 703; (?) in U.S.A., 449; relation of, to little leaf, 449.  
 —, *Taphrina deformans* on, control, 315, 594; factors affecting, 594; occurrence in Canada, 44, 594; in France, 594; in Western Australia, 315; in U.S.A., 374; overwintering of, 44; study on, 374.  
 —, *Valsa cincta* on, in Canada, 594; (?) in Italy, 450.  
 —, — *leucostoma* on, *Cytospora* (?) *candida* a stage of, 15; occurrence in the Argentine, 15; in Canada, 594.  
 —, yellows, control, 374, 705; occurrence in U.S.A., 219, 374, 704, 705; studies on, 704, 705; transmission of, by budding, 705; by *Macropsis trimaculata*, 498, 682, 704, 705; virus of, affecting plum in U.S.A., 682, 704; *Prunus munsoniana* in U.S.A., 682; *P. salicina* in U.S.A., 682, 705.  
 Pear (*Pyrus communis*), *Bacillus amylovorus* on, breeding against, 318; control, 221, 318, 497; method of infection by, 370; occurrence in Canada, 221; in U.S.A., 221, 318, 370, 497; varietal resistance to, 318; viability of, 221.  
 —, *Bacterium fluorescens* on, pathogenicity of, 16.  
 —, — *nectarophilum* on, in Natal, 453.  
 —, — *tumefaciens* on, in Hungary, 499.  
 —, bitter pit, virus nature of, 639, 640.  
 —, blossom drop of, in Natal, 453.  
 —, *Ceratostomella catoniana* on, see *Ophiostoma catonianum* on.  
 —, *Ciboria aestivalis* on, in New S. Wales, 704.  
 —, *Coniothyrium* on, factors affecting, 12; occurrence in Canada, 44, 177; in Holland, 12; overwintering of, 44.  
 —, chlorosis, see mosaic.  
 —, *Corticium stevensii* on, in U.S.A., 795.  
 —, *Cytospora microspora* on, in Italy, 450.  
 —, degeneration in Italy, 317.  
 —, *Diaporthe parasitica* on, in Belgium, 679.

[Pear], die-back of, in Holland, 12.  
 —, *Diplosporium album* on, in Holland, 12.  
 — diseases, control in Morocco, 517; in U.S.A., 768; occurrence in U.S.A., 450.  
 —, *Elsinoe piri* on, in the Argentine, 223.  
 —, *Fabrea maculata* on, in U.S.A., 381.  
 —, *Fomes ribis* on, in U.S.S.R., 62.  
 —, *Glomerella cingulata* can infect, 40.  
 —, *Helminthosporium papulosum* on, in U.S.A., 372.  
 —, internal breakdown of, in Italy, 373.  
 —, *Lambertella corni-maris* on, in Germany, 451; may be identical with *Phaeosclerotinia nipponica*, 451.  
 —, little leaf of, in S. Africa, 42.  
 —, mosaic of, occurrence in Bulgaria, 316, 639, 640; transmission of, to apple, 316, 640; varietal susceptibility to, 639.  
 —, moulds on, control, 450.  
 —, *Mycosphaerella sentina* on, ascospore discharge of, 590; factors affecting, 771; occurrence in Austria, 771; in England, 617; in Germany, 79; in Switzerland, 590; varietal susceptibility to, 79, 771.  
 —, *Neofabraea malicorticis* on, in Holland, 12.  
 —, *Ophiostoma catonianum* on, in Italy, 373, 702; *Graphium pirinum* and *Hyalodendron pirinum* imperfect forms of, 702.  
 —, *Phaciella discolor* on, in France, 42.  
 —, *Physalospora piricola* on, in Japan, 498, 640; *Macrophoma kuwatsukai* imperfect stage of, 640.  
 —, *Pseudomonas ultiformica* on, 16.  
 —, *Rosellinia necatrix* can infect, 177.  
 —, *Venturia pirina* on, ascospore discharge of, 590; control, 43, 79, 315, 454, 517, 589, 590; factors affecting, 317; legislation against, in England, 336, 672; occurrence in the Argentine, 371; in Australia, 43; in Austria, 772; in England, 672; in France, 454; in Germany, 79, 317, 517, 589; in Holland, 13, 40; in Switzerland, 590; in Western Australia, 315; overwintering of, 40; varietal resistance to, 454, 772.  
 —, *Verticillium* (?) *albo-atrum* on, in Italy, 641.  
 Peas (*Pisum sativum*), *Aphanomyces* on, in Tasmania, 425.  
 —, — *euteiches* on, in France, 286; in U.S.A., 151.  
 —, *Ascochyta* on, control, 429; factors affecting, 428; notes on, 428, 683; occurrence in U.S.A., 219, 428, 683.  
 —, — *pinodella* on, notes on, 547, 613; occurrence in Japan, 547; in U.S.A., 614.  
 —, — *pisi* on, note on, 547, 613; occurrence in the Argentine, 15; in Japan, 547; in U.S.A., 71, 614.  
 —, *Bacillus* and (?) *Bacterium herbicola aureum* on, in England, 280.  
 —, broad bean mosaic can infect, 4.  
 —, *Cladosporium pisicolum* on, in U.S.A., 71.  
 [Peas], *Corticium solani* on, in Canada, 603; in U.S.A., (?) 151, 463.  
 —, damping-off of, in U.S.A., 671.  
 — diseases in England, 414; in U.S.A., 279.  
 —, *Erysiphe polygoni* on, in U.S.A., 287.  
 —, *Fusarium* on, in England, 423, 730; in U.S.A., 219.  
 —, — *avenaceum* (= *F. herbarum*) on, in Central Europe, 613.  
 —, — *culmorum* on, in the Argentine, 720; in Central Europe, 613.  
 —, — *equiseti* on, in the Argentine, 720.  
 —, — *orthoceras* var. *pisi* on, in U.S.A., 71, 148.  
 —, — *oxysporum* f. 8 (= *F. vasinfectum* var. *pisi*) on, in Germany and Italy, 613; in U.S.A., 486, 613.  
 —, — var. *aurantiacum* on, in U.S.A., 72.  
 —, — *redolens* on, in Central Europe and Germany, 613; in U.S.A., 72.  
 —, — *solani* var. *martii* f. 2 on, *F. martii* var. *pisi* renamed, 334; *F. solani* var. *striatum* considered identical with, 613; occurrence in Central Europe, 613; in Holland, 613; study on, 334.  
 —, — *vasinfectum* var. *lutulatum* on, in U.S.A., 72.  
 —, internal breakdown of, in U.S.A., 341.  
 —, marsh spot of, in England, 279, 280.  
 —, mosaic of, included in 'St. John's disease', 613; incubation of the virus of, in *Macrosiphum gei* and *M. pisi*, 415; occurrence in U.S.A., 415, 486; transmission of, by *M. gei*, 415; by *M. pisi*, 415, 486; to bean, clover, and sweet pea, 486. (See also Pea mosaic viruses 2 and 3.)  
 —, — virus 2 in U.S.A., 415; serological relationships of, 782; transmission of, by *Macrosiphum gei* and *M. pisi*, 415; by mechanical means, 415.  
 —, — 3, serological relationships of, 782.  
 —, *Mycosphaerella pinodes* on, ascigerous stage of, 547; control, 429; effect of, on physiology of host, 52; factors affecting, 428; notes on, 428, 613; occurrence in the Argentine, 15; in Japan, 547; in U.S.A., 428, 614, 683; in U.S.S.R., 52; overwintering of, 683.  
 —, near wilt of, see *Fusarium oxysporum* f. 8 on.  
 —, *Peronospora viciae* on, control, 287; occurrence in Tasmania, 425; in U.S.A., 71, 287, 340; study on, 340.  
 —, physiological spotting of seed of, in Mexico and U.S.A., 341.  
 —, *Phytophthora parasitica* on, in Brazil, 87.  
 —, (?) *Pullularia pullulans* on, in U.S.A., 2.  
 —, Pythiaceous fungus on, in Denmark, 559.  
 —, (?) *Pythium* on, in U.S.A., 151.  
 —, 'St. John's disease' of, a general term for several diseases, 613.  
 Peat, alkaline, use of, against 'white bud' of maize, 576.

Pecan (*Carya pecan*), *Articularia quercina* var. *minor* on, in U.S.A., 408.

—, *Gnomonia nerviseda* on, in U.S.A., 537; perfect stage of *Leptothyrium nervisedum*, 537.

—, little leaf of, in U.S.A., 767, 768.

—, moulding in U.S.A., 683.

—, rosette in U.S.A., 538.

*Pediculoides dianthophilus*, symbiosis between *Fusarium poae* and, 512.

*Pedilospora dactylopaga* on *Diffugia globulosa*, rhizopods, and *Trinema encelys* in U.S.A., 99.

*Pelargonium*, *Macrosporium pelargonii* on, in Italy, 681.

—, *zonale*, *Bacterium tumefaciens* on, 499, 740; serological reactions to, 430.

*Penicillium*, antagonism of, to *Corticium solani*, 188; to *Ophiobolus graminis* on wheat, 689; to various fungi, 387.

—, decomposition of hemicelluloses by, 55.

—, in butter, 761.

—, in eggs in France, 237.

—, in relation to mycorrhiza, 247.

—, in soil, 392; in Canada, 791.

—, in the upper air in U.S.A., 326.

—, industrial fermentation of pentosans by, 604.

—, on apple in storage in Italy, 373.

—, on barley in Canada, 158.

—, on chestnuts in Italy, 801.

—, on cotton textiles, 585.

—, on fruit in storage in U.S.A., 322.

—, on maize in U.S.A., 232.

—, on mango in transit from India, 518.

—, on mushrooms in Great Britain, 346.

—, on narcissus in England, 366.

—, on orange from Cyprus, 742.

—, on pineapple in Hawaii, 456; in Queensland, 216; *Pseudococcus brevipes* and a mite in relation to, 216.

—, on plum in England, 641.

—, on soy-bean cakes in Japan, 671.

—, on timber in U.S.S.R., 270.

—, on tulip in England, 366.

—, on vegetables in storage in U.S.A., 322.

—, on vine in S. Africa, 213.

—, on wheat in U.S.S.R., 298.

—, production of fat from glucose by, 522.

—, *crustaceum* in Italian leavens, 383.

—, *digitatum* on citrus, control, 163, 628; occurrence in Sierra Leone, 428; in U.S.A., 163, 628.

—, — on grapefruit in Trinidad, 182, 754.

—, — on lemon, antagonism of, to *P. italicum*, 30.

—, — on orange, antagonism of, to *P. italicum*, 30; control, 30, 96, 321, 506; factors affecting, 30, 441, 506, 578; method of testing susceptibility to, 441; mixed inoculations with, 30, 577; occurrence in England, 321; in Palestine, 30, 506, 577; in S. Africa, 96, 440, 441; in U.S.A., 578; studies on, 30, 96.

—, *expansum*, cultural study on, 60.

—, — on apple in Italy, 373; in U.S.A., 287, 592; varietal resistance to, 373; virulence of, 40.

[*Penicillium expansum*] on avocado in U.S.A., 707.

—, — on timber, 762.

—, *fellutatum* in butter in U.S.A., 237.

—, *flavo-cinereum*, production of fat by, 522.

—, *flavo-glaucum* on meat, factors affecting, 633.

—, *gladioli* on gladiolus in U.S.A., 173.

—, *glaucum*, effect of radiations of metals on, 646.

—, — in Italian and other leavens, 383.

—, — in pharmaceutical preparations in Denmark, 114; toxicity of certain chemicals to, 115.

—, — on grapes in S. Africa, 491.

—, *griseo-fulvum* in butter in U.S.A., 237.

—, *humicola* in hay in U.S.A., 249.

—, *italicum* on apple in Italy, 373.

—, — on citrus, control, 163, 628; occurrence in U.S.A., 628.

—, — on grapefruit in Trinidad, 182, 754.

—, — on lemon, antagonism of, to *P. digitatum*, 30.

—, — on orange, antagonism of, to *P. digitatum*, 30; control, 30, 506; factors affecting, 30, 506, 578; occurrence in Palestine, 30, 506; in U.S.A., 578; study on, 30.

—, *javanicum*, production of fat from glucose by, 522.

—, *lilacinum* in soil, 392.

—, (?) *notatum*, antagonism of, to bacteria, 464.

—, *olivino-viride* on apple in Italy, 373.

—, *oxalicum* on hay in U.S.A., 249.

—, — on maize, 355.

—, *piscarium*, production of fat by, 522.

—, *puberulum* on timber, 762.

—, *roqueforti*, longevity of, 648.

—, *velutinum* on man in Holland, 471.

—, *viridicatum* in butter in U.S.A., 237.

—, *waksmani* on soy-bean cakes in Japan, 671.

*Peniophora gigantea* on timber in U.S.S.R., 270.

—, — on wood pulp in England, 137.

*Pennisetum purpureum*, *Helminthosporium* on, in Trinidad, 13.

—, *typhoides* diseases in Kenya, 744.

—, —, *Fusarium campoceras* on, in India, 472.

—, —, *Helminthosporium leucostylum* and *H. nodulosum* can infect, 440.

(?) —, —, *Phytomonas rubrilineans* on, in Uganda, 793.

—, —, *Ustilago penniseti* on, in India, 81.

Pentathionic acid, use of, against grape wastage in S. Africa, 491.

Pentosans, fermentation of, by various fungi, 604.

*Pentstemon*, *Corticium centrifugum* on, in Japan, 719.

—, tomato spotted wilt can infect, 404.

Peony (*Paeonia*), *Botrytis paeoniae* on, in the United Kingdom, 15.

—, *Phyllosticta paeoniae* on, in Spain, 396.

—, *Sphaeropsis paeoniae* on, in Italy, 107.

—, virus disease of, in France, 199; relation of, to potato virus X, 199; trans-

mission of, to *Petunia*, 200; to tobacco, 199.

Pepper (betel), see *Piper betle*.

Pepper (*Capsicum annuum*), see Chilli.

Pepper (*Piper nigrum*) chlorosis in Sumatra, 152.

—, *Corticium salmonicolor* on, in Borneo, 152.

—, die-back of, in Sumatra, 152.

—, *Marasmius* on, in Borneo, 152.

—, *Phytophthora* on, in Borneo, 152, 743; in Java and Sumatra, 152.

Peppermint (*Mentha piperita*), *Puccinia menthae* on, in Estonia, 530.

*Pergandeida* transmitting tobacco virus 1 (tomato fern-leaf mosaic), 132.

*Peridermium coloradense* on spruce in U.S.A., 794.

(?) — *pini* on pine in Switzerland, 339.

*Perkinsiella saccharicida* transmitting Fiji disease of sugar-cane in Queensland, 333.

*Peronospora* on chilli in U.S.A., 344.

— on tobacco in U.S.A., 348, 403.

— *effusa* on spinach in U.S.A., 141, 417.

— *hyoscyami* and *P. nicotianae* in relation to tobacco downy mildew in U.S.A., 657.

— *parasitica* can infect *Brassica juncea*, 1; *Cheiranthus allioni*, 546.

— on *Brassica chinensis* in Japan, 1.

— on cabbage, factors affecting, 277, 546, 565; hetero- and homothallism in, 415; occurrence in Holland, 546; in U.S.A., 415, 546, 565; in U.S.S.R., 277; specialization in, 1.

— on cabbage, Chinese, in Japan, 1.

— on cauliflower, 546.

— on radish and rape in Japan, 1.

— *schachtii* on beet in Europe, 548.

— *schleideni* on onion in England, 488; in U.S.A., 417.

— *sparsa* on rose in England, 313.

— *tabacina* can infect chilli, 723.

(?) — — on eggplant in Australia, 724.

— — on tobacco, control, 200, 216; legislation against, in New S. Wales, 200; occurrence in New S. Wales, 200; in Queensland, 216; in U.S.A., 657, 723; overwintering of, 723; taxonomy of, 657.

(?) — — on tomato in Australia, 724.

— *trifolii hybidi* on clover in Estonia, 241.

— *trifoliorum* on clover in Estonia, 241.

— *viciae* on peas, control, 287; occurrence in Tasmania, 425; in U.S.A., 71, 287, 340; study on, 340.

Peronosporaceae, climate in relation to, 325.

—, list of Rumanian, 471.

*Persea gratissima*, see Avocado.

Persimmon (*Diospyros kaki*), *Coryneum delleanii* on, in Italy, 113, 656.

—, *Phoma kaki* on, and reddening of, in Italy, 656.

*Pestalozzia* on avocado in U.S.A., 707.

— on *Cibotium schiedei* in U.S.A., 152.

— on coffee in the Cameroons, 32.

— on *Nephelium litchi* in S. Africa, 426.

— on pine in U.S.A., 409.

[*Pestalozzia*] on rhododendron in Germany, 173.

— (?) *decolorata* on *Myrtus communis* in Cyprus, 84.

— *funerea* on *Thuja occidentalis* in Italy, 608.

— *gongrogena* on *Salix* in Austria, 135.

— *gracilis* on *Cryptocarya peumus* in Italy, 608.

— *macrotricha* on *Kalmia latifolia* in Italy, 608.

— *palmarum* on *Howea forsteriana* in Italy, 608.

— *podocarpi*, *Podocarpus elongata* on, in Scotland, 136.

— *stellata*, toxicity of various elements to, 244.

Petea of lemon, suggested virus nature of, 505.

*Petroselinum sativum*, see Parsley.

*Petunia*, bunchy top of tomato can infect, 800.

— mosaic in Japan, 699; transmission of, to tobacco, 699.

—, peony virus can infect, 200.

—, potato calico disease can infect, 787.

—, tomato spotted wilt can infect, 610; occurrence in U.S.A., 201; in Western Australia, 129.

— *hybrida*, *Bacterium tumefaciens* on, in Hungary, 499.

— —, celery virus 1 on, in U.S.A., 615.

— —, virus disease of, in Bermuda, 560.

*Peziotrichum saccardinum* on *Aspidotus perniciosus* in the Argentine, 98.

'Pfropfenbildung' of potato synonym of potato concentric necrosis, 253.

*Phaelia whitlavia*, celery virus 1 can infect, 5.

— —, cucumber mosaic can infect, 473.

*Phaciella discolor* on pear in France, 42.

*Phacidium* on rhododendron in Germany, 173.

— *infestans* on pine in Norway, 266.

*Phaeosclerotinia nipponica* on apple in Japan, 451; *Lambertella corni-mari* may be identical with, 451.

*Phakopsora pachyrhizi* on soy-bean in Japan, 533.

— *zizyphi-rugulosa* on *Paliurus ramosissimus* in Japan, 719.

*Phalaris arundinacea*, *Erysiphe graminis* on, in Germany, 572.

— —, *Sclerotium rhizodes* on, in Germany, 39.

*Phaseolus*, mosaic of, in Uganda, 82.

— *aconitifolius*, *Ascochyta pinodella*, *A. pisi*, and *Mycosphaerella pinodes* can infect, 614.

— *angularis*, *Ascochyta boltshauseri* can infect, 614.

— *aureus*, *Ascochyta boltshauseri*, *A. pinodella*, and *A. pisi* can infect, 614.

— —, *Cercospora cruenta* on, 280.

— —, *Mycosphaerella pinodes* can infect, 614.

— —, *Oidium* (?) *balsamii* on, in Ceylon, 146.

— *coccineus*, *Ascochyta boltshauseri* can infect, 614.

[*Phaseolus*] *lunatus*, *Bacterium vignae* on, 16.  
 —, (?) *Colletotrichum* on, in U.S.A., 4.  
 —, — *truncatum* on, in U.S.A., 416.  
 —, (?) *Corticium solani* on, in U.S.A., 151.  
 —, *Nematospora coryli*, and *N. gossypii* on, in the Belgian Congo, 507.  
 —, (?) *Pullularia pullulans* on, in U.S.A., 2.  
 —, (?) *Pythium* on, in U.S.A., 151.  
 —, *Rhizoctonia microsclerotia* on, in U.S.A., 417.  
 —, *Spermophthora gossypii* on, in the Belgian Congo, 507.  
 —, *Uromyces appendiculatus* can infect, 670.  
 — *multiflorus*, see Bean.  
 — *radiatus* var. *aurea*, *Colletotrichum phaeosorum* on, in Japan, 342.  
 — *vulgaris*, see Bean.

Phenol, effect of, on growth of Mycotomycetidae, *Saccharomyces cerevisiae*, and *Torulopsisidaceae* in culture, 306.  
 —, toxicity of, to *Pseudomonas mors-prunorum*, 641.  
 — derivatives, action of, on *Candida tropicalis*, 584, 758.  
 —, chemical constitution in relation to the toxicity of, 105.

Phenolic compounds, toxicity of, to *Aspergillus niger*, *Botrytis allii*, *Colletotrichum circinans*, and *Gibberella saubinetii*, 553.

Phenols, chlorinated, use of, against blue stain of timber in Finland, 729.

Phenoxy-compounds, use of, against *Cladosporium fulvum* on tomato, 78.

Phenyl mercuric acetate, use of, against mildew on paint, 520.

*Phesia nu*, *Sporotrichum globuliferum* and *S. paranense* on, in the Argentine, 98.

*Phialophora verrucosa* on man, 100; in Uruguay and U.S.A., 509.

*Philippia*, *Aloysiella deformans* on, in Madagascar, 333; *Othia deformans* synonym of, 333.

(?) *Phleospora* on granadilla in Trinidad, 182.  
 — *mori* on mulberry in Italy, 265.

*Phleum pratense*, *Corticium solani* can infect, 603.  
 —, — *Epichloe typhina* on, in Germany, 766.  
 —, — *Puccinia graminis* on, 687.  
 —, — *lolii* can infect, 435.  
 —, — *phelei-pratensis* on, in Rumania, 514.

Phloem necrosis of coffee in Venezuela, 397.

*Phlox*, *Corticium centrifugum* on, in Japan, 719.

*Phoenix canariensis*, *Diplodia phoenicum* on, in Tunis, 429.  
 — *dactylifera*, see Date palm.

*Pholidota imbricata*, *Gloeosporium* on, in U.S.A., 587.

*Pholiota squarrosa* on conifers in Great Britain, 803.  
 — on fruit trees in Germany, 677.

*Phoma* in butter, 761; in U.S.A., 237.  
 — on elm in U.S.A., 537.  
 — on rhododendron in Germany, 173.  
 — stage of *Ophiobolus fulgidus*, 125.  
 — *B* on elm in U.S.A., 203.  
 — *alternariaceum* in butter, 761.  
 — *amaryllidis* synonym of *Stagonospora curtisiae*, 448.  
 — *betae* on beet, action of *Torula convoluta* on, 281; control, 21, 151, 282, 548, 552, 809; effect of, on yield, 282; factors affecting, 73, 282; note on, 551; occurrence in Czecho-Slovakia, 73; in Europe, 548; in France, 282, 552; in Irish Free State, 809; in Sweden, 21; in U.S.A., 151; in U.S.S.R., 281; *Sphaerella tabifica* perfect form of, 552; study on, 281.  
 — *cinerescens* on fig in S. Africa, 426.  
 — *citricarpa* on orange in Queensland, 216.  
 — *destructiva* on tomato in Trinidad, 182; in U.S.A., 263, 475.  
 — *eriobotryae* on loquat in Italy, 778.  
 — *flaccida* on vine in France, 346, 675; in S. Africa, 426.  
 — (?) *hibernica* in air over the ocean, 384.  
 — *hominis* on man in Italy, 510.  
 — *kaki* on persimmon in Italy, 565.  
 — *lingam* can infect *Arabis albida*, *Matthiola incana*, radish, *Sisymbrium orientale*, and wallflower, 547.  
 — on cabbage in Canada, 494; in New Zealand, 547.  
 — on cauliflower in New Zealand, 547.  
 — on marrow-stem kale, resistance to, 558.  
 — on rape in New Zealand, 547.  
 — on swedes in Great Britain, 558, 807; in New Zealand, 547.  
 — on turnip in New Zealand, 546.  
 — *persicae* on peach in the Argentine, 15.  
 — *pigmentivora* causing discolouration of white lead paints in England, 137.  
 — *terrestris* on onion in U.S.A., 150.

*Phomopsis* on black currant in France, 377.  
 — on *Gardenia* in U.S.A., 107.  
 — on *Juniperus virginiana* in U.S.A., 150.  
 — on loquat intercepted in U.S.A. from Italy, 816.  
 — on mango in transit from India, 518.  
 — on rose, sporulation of, 453.  
 — on *Viburnum opulus* in U.S.A., 174.  
 — *artocarpi* on *Artocarpus integrifolia* in India, 470.  
 — *citri*, imperfect stage of *Diaporthe citri*, 15.  
 —, sporulation of, 453.  
 — *coneglanensis* on apple, virulence of, 40.  
 —, —, sporulation of, 453.  
 — *crustosa* on holly in U.S.A., 587.  
 — *papayae* on papaw in Trinidad, 182.  
 — *pseudotsugae* on *Pseudotsuga taxifolia* in England, 264.  
 — *strobi* on forest trees in New Zealand, 65.  
 — on pine in New Zealand, 65, 651.  
 — *P. pseudotsugae* nearly related to, 541.  
 — *vezans* on eggplant in U.S.A., 151.

Phony peach disease in U.S.A., 64, 374.  
 Phosphatide, use of, with creosote as a timber preservative, 205.  
 Phosphorus deficiency disease of sisal in the Belgian Congo, 237.  
 —, excess of, in relation to *Peronospora parasitica* on cabbage, 565.  
 —, see also Fertilizers.  
*Photinia*, *Gymnosporangium globosum* on, immunity from, 368.  
 Photography, infra-red, see Infra-red photography.  
*Phragmidium*, Japanese species of, 654.  
 — A and B on rose in England, 638.  
 — *mucronatum* on rose in England, 313.  
 — *violaceum*, receptive hyphae of, 464.  
*Phragmites*, *Puccinia magnusiana* on, in Germany, 364.  
 — *communis*, *Puccinia phragmitis* on, sporulation in, 53.  
*Phragmotothryium japonicum* on bamboo in Japan, 108.  
 — *semiarundinariae* on bamboo in Japan, 107; *Microtelis bambusicola* synonym of, 107.  
*Phthorimaea operculella* in relation to leaf curl of tobacco, 335.  
*Phycomyces* in soil in Europe, 655.  
 (?) *Phycomycete* on guava in Brazil, 778.  
*Phycomycetes*, list of Danish fresh-water, 59.  
*Phyllachora trifolii*, synonym of *Cyamodothea trifolii*, 367.  
*Phylactinia acaciae* on *Acacia robusta* in S. Africa, 793.  
 — *corylea* on *Corylus avellana* in Italy, 680; in U.S.A., 204.  
 — on *Corylus rostrata* in U.S.A., 204.  
*Phylodocie empetriiformis*, *Exobasidium vaccinii-uliginosi* on, in U.S.A., 66.  
*Phyllostachys*, see Bamboo.  
*Phyllosticta aceris* on *Acer campestre* in Spain, 396.  
 — *alcidis* synonym of *P. populina*, 479.  
 — *batatas* on sweet potato in Brazil, 87.  
 — *betae* on beet in Europe, 548.  
 — *cinerea* synonym of *P. populina*, 479.  
 — *cunninghami* on rhododendron in Germany, 174.  
 — *gemmipara* synonym of *Stagonospora curtisii*, 448.  
 — *hawaiiensis* synonym of *P. sorghina*, 57.  
 — *paeoniae* on peony in Spain, 396.  
 — *panici* synonym of *P. sorghina*, 57.  
 — *populina* on poplar in Italy, 478; synonymy of, 479.  
 — *prominens* synonym of *P. populina*, 479.  
 — *sacchari* synonym of *P. sorghina*, 57.  
 — (?) *saccharicola* as a stage of *Leptosphaeria sacchari*, 57.  
 — *sorghina* on *Panicum autumnale*, *P. maximum*, and sorghum, 57.  
 — on sugar-cane in U.S.A., 57; synonymy of, 57.  
 — (?) *straminella* on rhubarb in U.S.A., 7.  
 — *tabifica* on beet in Spain, 396; (?) pycnidial stage of *Mycosphaerella tabifica*, 396.  
*Phymatotrichum omnivorum* on *Acacia pendula*, ash, *Caesalpinia gillesii*, *Casuarina*, and *Cotoneaster* in U.S.A., 562.  
 — on cotton, control, 381, 442, 443, 629; effect of, on fibre and seed, 360; evaluation of losses caused by, 304; factors affecting, 442, 443; occurrence in U.S.A., 165, 166, 304, 360, 442, 443, 629; persistent strands of, 165, 166; studies on, 166, 442, 443; viability of sclerotia of, 304.  
 — on *Feijoa sellowiana*, *Ligustrum (?) japonicum*, *L. ovalifolium*, mulberry, *Pyracantha*, *Schinus molle*, and *Sterculia* in U.S.A., 562.  
 — on watermelon, antagonism of *Trichoderma lignorum* to, 739; occurrence in U.S.A., 738.  
*Physalis*, celery virus 1 can infect, 5; occurrence on, in U.S.A., 615.  
 — *Cercospora physalidis* on, in U.S.A., 195.  
 — *alkekengi*, celery virus 1 on, in U.S.A., 615.  
 — *angulata*, bunchy top of tomato can infect, 800.  
 — *heterophylla* and *P. longifolia*, cucumber mosaic affecting, in U.S.A., 473.  
 — *peruviana*, *Bacterium solanacearum* on, in Ceylon, 146.  
 —, tobacco virus 1 can infect, 197.  
 —, tomato bunchy top can infect, 800.  
 — *pubescens*, celery virus 1 on, in U.S.A., 615.  
 — *virginiana*, *Bacterium tabacum* on, in U.S.A., 223.  
 — *viscosa*, tomato bunchy top can infect, 800.  
*Physalospora cydoniae*, see *P. obtusa*.  
 — *eucalyptina* on *Eucalyptus*, interception of, in U.S.A. from Mexico, 816.  
 — *malorum*, see *P. obtusa*.  
 — *miyabeana* on *Salix* in England, 479.  
 (?) — *obtusa* on apple in Bulgaria, 316; in Peru, 315; in U.S.A., 371.  
 — on loquat in Italy, 777.  
 — (?) — on quince in France, 371; in U.S.A., 371.  
 — *perseae* renamed *Melanops perseae*, 124.  
 — *piricola* can infect apple, 640.  
 — on pear in Japan, 498, 640; *Macrophoma kuwatsukai* imperfect stage of, 640.  
 — *zeicola* on maize in U.S.A., 86, 564.  
 Physiologic specialization of parasitic fungi, 648.  
 Physiological blossom-end rot of chilli in U.S.A., 344.  
 — breakdown of oranges in Palestine, 31.  
 — — of peach in U.S.A., 773.  
 — disease of apricot, peach, and plum in Egypt, 177.  
 — — of tomato in Jersey, 492.  
 — disorders of mango in transit from India, 518.  
 — — of tobacco, recent literature on, 474.  
 — spotting of peas in Mexico and U.S.A., 341.  
*Physostegia virginiana*, *Sclerotium delphinii* on, in U.S.A., 147.

*Phytolacca decandra*, yellow cucumber mosaic can infect, 534.

*Phytononas berberidis* on barberry in Denmark, 78.

— *leptoasorum* on coffee in British Guiana, 218.

— *rubrilineans* on sugar-cane in Queensland, 56; in Uganda, 793.

— *woodsii* on carnation in U.S.A., 365.

Phytopathology, see Plant diseases, Plant protection.

*Phytophthora* can infect apple and potato, 147.

—, culture medium for, 194.

— on banana in Australia, 517.

— on *Campanula persicifolia* and carnation in U.S.A., 147.

— on *Chrysanthemum* (?) *coccineum* in U.S.A., 222.

— on *Delphinium*, *Gypsophila paniculata*, lily, and *Nigella damascena* in U.S.A., 147.

— on orange in Italy, 680, 692.

— on papaw in Queensland, 216.

— on pepper in Borneo, 152, 743; in Java and Sumatra, 152.

— on pineapple in Hawaii, 455, 604.

— on *Piper betle* in India, 122.

— on rice in Japan, 119.

— on strawberry in Scotland, 180; in U.S.A., 682.

— on sweet potato in U.S.A., 467.

— on tomato in S. Africa, 426.

— on tulip in England, 366.

— *Pleolpidium* parasitizing, in U.S.A., 195.

—, taxonomy of, 194, 398.

— *arecae* referred to *P. palmivora*, 399.

— *cactorum* on *antirrhinum* in S. Africa, 238; in U.S.A., 195; *P. pini* var. *antirrhini* synonym of, 238.

— on apple in U.S.A., 371.

— (?) — on avocado in U.S.A., 707.

— on lily in Japan, 147, 498.

— on loquat in Japan, 147.

— on rhododendron (?) in France, 314; in Germany, 173.

— *cambivora* on beech in England, 264.

— on chestnut in England, 264; in Italy, 680.

— on walnut in Italy, 680.

— *capsici* on chilli in U.S.A., 222.

— *cinnamomi* can infect pineapple, 194.

— on chestnut in England, 264; in U.S.A., 147.

— on cinnamon, 194.

— (?) — on pine in U.S.A., 409.

— on pineapple, control, 458; occurrence in Australia, 194; in Hawaii, 194, 604; in Queensland, 457, 458; studies on, 457, 458; zoosporangial development in, 194, 604.

— *citrophthora* on avocado pear in U.S.A., 707.

— on citrus in U.S.A., 628; in Western Australia, 315.

— on orange in Rhodesia, 427, 678.

— *colocasiae* on *Colocasia antiquorum* in India, 122.

— *drechsleri* on beet in U.S.A., 147.

[*Phytophthora*] *hibernalis* on citrus in Western Australia, 315.

— *infestans*, method of infection by, 790.

— on potato, breeding against, 391, 708; control, 13, 84, 189, 391, 465, 492, 495, 527, 606, 789; effect of, on yield, 392; factors affecting, 189, 325, 391; legislation against, in Sweden, 672; occurrence in Austria, 463; in Canada, 324; in England, 676, 789; in France, 189; in Germany, 390, 527, 606; in Holland, 13, 715; in Jersey, 492, 527; in Mauritius, 84; in Scotland, 789; in Sweden, 672; in U.S.A., 85, 391, 495, 606, 789; phenology of, 189, 676, 715; specialization in, 390; spray warnings against, 13, 495; studies on, 189, 390; varietal and specific resistance to, 390, 496, 606; viability of, 391.

— on tomato, control, 218, 563; occurrence in Bermuda, 559; in Germany, 390; in U.S.A., 218, 405, 563; specialization in, 390; transmission of, by seed, 405.

— *jatropha* referred to *P. palmivora*, 399.

— *meadii* on *Hevea* rubber in India, 123.

— on pineapple in Hawaii, 455.

— referred to *P. palmivora*, 399.

— *megasperma* on carrot in Tasmania, 211.

— *melongena* referred to *P. palmivora*, 399.

— *palmivora* can infect *Colocasia antiquorum*, 123.

— on cacao, control, 217, 566, 567; note on, 224; occurrence in the British Empire, 87; in Nigeria, 217; in the Philippines, 567; (?) in Venezuela, 397.

— on *Durio zibethinus* in Malaya, 46.

— on grapefruit, control, 627; factors affecting, 754; occurrence in Trinidad, 505, 627.

— on *Hevea* rubber, 47, 194; in Java, 743.

— on Palmyra palm in India, 122.

— on pineapple, 194.

—, *P. arecae*, *P. jatropha*, *P. meadii*, *P. melongena*, *P. parasitica*, and *P. tabaci* referred to, 399.

— *parasitica* can infect eggplant and lemons, 506; pineapple, 194; tomato, 636.

— on *Agapanthus* in Japan, 498.

— on *Antirrhinum*, 194; in Rhodesia, 678.

— (?) — on avocado pear in U.S.A., 707.

— on *Clarkia* and *Delphinium* in Rhodesia, 678.

— on eggplant, 194.

— on *Godetia* in Rhodesia, 678.

— on grapefruit, factors affecting, 505, 754; occurrence in Trinidad, 505, 627.

— on lily in Japan, 147, 498.

— on orange in Java, 301.

— on peas in Brazil, 87.

— on *Piper betle* in India, 122, 147; in Malaya, 122.

— on potato, 194.

— on *Ricinus communis* in India, 123.

— (?) — on *Solanum capsicastrum* in England, 636.

[*Phytophthora parasitica*] on tomato, 194; in U.S.A., 263.  
 —— referred to *P. palmivora*, 399.  
 ——, zoosporangial production in, 194.  
 —— f. *eribotryae* on loquat in Italy, 778.  
 —— *nicotianae* on tobacco, control, 533; factors affecting, 608; occurrence in French Indo-China, 126; in Java, 533, 743; in Sumatra, 473; in U.S.A., 608.  
 —— var. *piperina* can infect *Martynia diandra*, *Ricinus communis*, and *Vinca rosea*, 717.  
 —— —— on *Piper betle* in India, 717.  
 —— var. *rhei*, dissociation in, 398.  
 — *pini* var. *antirrhini* synonym of *P. cactorum*, 238.  
 — *speciosa* on *Gloxinia* in Germany, 637.  
 — *syringae* on beech in England, 264.  
 — (?) — on *Erica hiemalis* and *E. nivalis* in England, 637.  
 — *tabaci* referred to *P. palmivora*, 399.  
*Picea*, see Spruce.  
*Pigeon pea* (*Cajanus cajan*), *Armillaria mellea* on, in Nyasaland, 14.  
 ——, *Corticium solani*, *Fusarium vasinfectum*, and *Neocomospora vasinfecta* on, in India, 144.  
*Pigs*, use of barley infected with *Gibberella saubinetii* as feed for, 231.  
*Pilobolus*, biology and taxonomy of, 184.  
*Pimento* (*Pimenta officinalis*), *Puccinia psidii* on, in Jamaica, 656, 792.  
*Pine* (*Pinus*), *Armillaria matsuake* on, forming mycorrhiza in Japan, 284.  
 ——, *ponderosa* on, in U.S.A., 285.  
 ——, *Atropellis pinicola* on, in U.S.A., 540.  
 ——, *Cenangium abietis* on, in Germany, 476.  
 ——, *Ceratostomella ips* on, in U.S.A., 68; *Dendroctonus frontalis* and *Ips* spp. in relation to, 68.  
 ——, *piceae* on, in Japan, 804; in U.S.S.R., 68; *Cladosporium* stage of, 804.  
 ——, *pini* on, in Japan, 275; in U.S.A., 68; *Dendroctonus frontalis* and *Ips* spp. in relation to, 68.  
 ——, *Cladosporium herbarum* on, in U.S.S.R., 68.  
 ——, *Coniophora* (?) *fusispora* on, in Sweden, 803.  
 ——, (?) *Cronartium asclepiadeum* on, in Switzerland, 339.  
 ——, *ribicola* on, control, 64, 455, 540, 541, 666, 727; occurrence in Canada, 66, 135, 377; in Germany, 541, 666; in U.S.A., 64, 220, 348, 377, 410, 540, 727; *Ribes* in relation to spread of, 66, 135; study on, 66, 135.  
 ——, *Dasyctypa fuscosanguinea* on, in Austria, 266.  
 ——, — *pini* on, in Canada, Norway, Sweden, and U.S.A., 266; *D. monticola* synonym of, 266; distinct from *D. fuscosanguinea*, 266; *Lachnella pini* renamed, 266.  
 ——, *Diplodia pinea* on, (?) in New Zealand, 65; in Rumania, 483.  
 ——, *Ericoccum purpurascens* and *Endoconidiophora coeruleascens* on, in U.S.S.R., 68.  
 [Pine], *Fomes annosus* on, in Great Britain, 804.  
 ——, — *laricis* on, in U.S.A., 205.  
 ——, — *pinicola* on, in Burma and India, 193.  
 —, *Fusarium* on, in U.S.S.R., 68.  
 —, *Helicobasidium compactum* on, in S. Africa, 426.  
 —, *Hypodermella hiratsukae* on, in Japan, 802.  
 —, leaf-fall of, in Rumania, 483.  
 —, *Lophodermium pinastri* on, in U.S.A., 663.  
 —, *Mycelium radicum nigrostrigosum* on, forming mycorrhiza in Japan, Sweden, and U.S.A., 187.  
 —, mycorrhiza of, factors affecting, 410; occurrence in England, 410; in Japan, 187, 284; in Sweden and U.S.A., 187.  
 —, 'needle fusion' disease of, in New S. Wales and Queensland, 425.  
 —, (?) *Peridermium pini* on, in Switzerland, 339.  
 —, *Pestalozzia* on, in U.S.A., 409.  
 —, *Phacidium infestans* on, in Norway, 266.  
 —, *Phomopsis strobi* on, in New Zealand, 65, 541; *P. pseudotsugae* nearly related to, 541.  
 —, *Phytophthora* (?) *cinnamomi* on, in U.S.A., 409.  
 —, *Polyporus borealis* and *P. schweinitzii* on, in Sweden, 803.  
 —, *Poria subacida* on, in U.S.A., 805.  
 —, — *vaporaria* on, in Sweden, 803.  
 —, *Rhizina undulata* on, in U.S.A., 663.  
 —, *Rhizoctonia* on, in U.S.A., 410.  
 —, *Sclerotium* on, in U.S.A., 410.  
 —, *Septoria acicola* on, in U.S.A., 266.  
 —, *Sphaeropsis* on, in U.S.A., 410.  
 —, — *ellisi* var. *chromogena* on, in Italy, 727; *Myelophilus piniperda* in relation to, 727.  
 —, *Stereum sanguinolentum* on, in U.S.A., 728.  
 —, *Trametes pini* on, *Fomes pini* preferred as a name for, 67; occurrence in U.S.A., 67; in U.S.S.R., 662.  
 —, *Tympans pinastri* on, in U.S.A., 612.  
 —, 'wet wood' of, in Finland, Lapland, Norway, and Sweden, 803.  
*Pineapple* (*Ananas comosus*), *Bacillus ananas* on, as the cause of fruitlet black rot (q.v.), 182, 456; occurrence in Hawaii, 456; in the Philippines, 456, 776.  
 —, *Bacterium ananas* on, distinct from *Bacillus ananas*, 456; occurrence in the Philippines, 456, 776. (See also fruitlet black rot of.)  
 — black heart in Queensland, 216.  
 —, *Ceratostomella paradoxa* on, in Hawaii, 455.  
 —, *Commelina nudiflora* mosaic can infect, 379.  
 — decay, control, 450.  
 —, dry side rot of, in Mauritius, 84.  
 —, fruit fermentation of, in Hawaii, 456.  
 — fruit rot in Hawaii, 455.  
 —, fruitlet black rot of, in Central

America, Guatemala, Haiti, the Philippines, Queensland, and West Indies, 181. (See also *Bacillus ananas* and *Bacterium ananas* on.)

[Pineapple, fruitlet] core rot of, in Queensland, 216.

—, *Fusarium* on, in Hawaii, 455, 456.

—, green spot of, (?) bacterial symbiont of *Pseudococcus brevipes* in relation to, in Hawaii, 379.

—, *Heterodera marioni* on, in Queensland, 457.

—, Kauai disease of, in Hawaii, 455.

—, 'marbled fruit' bacterial disease of, in Hawaii and Queensland, 216.

—, mealy bug wilt, control, 643; occurrence in Haiti, 457; in Hawaii, 455, 457; (?) in Mauritius, 84; in the Philippines, 457, 643; *Pseudococcus brevipes* in relation to, 84, 455, 457, 643.

—, moulds, control, 450.

—, *Penicillium* on, a mite and *Pseudococcus brevipes* in relation to, 216; occurrence in Hawaii, 456; in Queensland, 216.

—, *Phytophthora* on, in Hawaii, 455, 604.

—, — *cinnamomi* on, control, 458; note on, 194; occurrence in Australia, 194; in Hawaii, 194, 604; in Queensland, 457, 458; studies on, 457, 458; zoosporangial development in, 194, 604.

—, — *meadii* on, in Hawaii, 455.

—, — *palmivora* on, in Hawaii, 194.

—, — *parasitica* can infect, 194.

—, 'pink' bacterial disease of, in Hawaii, 216, 456; in Queensland, 216.

—, *Pythium* on, in Hawaii, 455.

—, — *arrhenomanes* on, in Hawaii, 95, 455; synonymy of, 95.

—, *Rhizidiocystis ananasi*, *Rhizoctonia*, and *Verticillium* on, in Hawaii, 455.

—, wilt, *Heterodera marioni* and *Lepidiota* in relation to, 457; occurrence in Queensland, 216, 457; types of, 455. (See also mealy bug wilt.)

—, yellow spot virus disease of, in Hawaii, 456.

'Pink cherry' of cherry in U.S.A., 288.

—, disease of pineapple in Hawaii, 216, 456; in Queensland, 216.

*Pinus*, see Pine.

*Piper betle*, *Colletotrichum* on, in India, 718.

—, — *Corticium rolfsii* on, in India, 125; *Sclerotium rolfsii* a stage of, 125.

—, — *solani* on, in India, 122, 718.

—, — *Glomerella cingulata* on, in India, 122.

—, — *Macrophomina phaseoli* on, in India, 718.

—, — *Oidium* on, in Burma, 286.

—, — *Phytophthora* on, in India, 122.

—, — *parasitica* on, in India, 122, 147; in Malaya, 122.

—, — var. *piperina* on, in India, 717.

← —, *Pythium piperinum* on, in India, 718.

—, — *Sclerotium rolfsii* on, in India, 122, 718.

—, *nigrum*, see Pepper.

*Piricularia* on *Digitaria* in Uganda, 82.

— on *Eleusine coracana* in Uganda, 81.

— *oryzae* on *Panicum sanguinale* in the Argentine, 529.

— on rice in the Argentine, 529; in Japan, 653.

*Pistacia terebinthus*, *Fomes rimosus* on, in U.S.S.R., 62.

Pistachio nut (*Pistacia vera*), *Septoria pistacia* on, in Tunis, 429.

—, — *Uromyces terebinthi* on, in Cyprus, 742.

*Pisum*, see Peas.

Pith disease of vine in Austria, 675.

*Pittosporum*, *Septoria pittospori* on, intercepted in U.S.A. from Scotland, 816.

*Pityrosporum*, a genus of the Torulopsoidea, 193.

— *malassezi* accepted as a good species, 193.

— *ovale* on man as the cause of seborrhoeic dermatitis, 509; occurrence in U.S.A., 696.

— *pachydermatis*, *P. rhinoserosum* synonym of, 193.

*Placosphaeria trifolii*, see *Dothidella trifolii*, 367.

Plane tree, see *Platanus*.

Plant diseases, bibliography of, for 1933, 324.

—, breeding against, theory and practice of, in Germany, 463.

—, certification against, in Holland, 608.

—, control, in Denmark, 559; in Holland, 599; in Sweden, 707.

—, list of common names of British, 325.

—, losses caused by, 18, 22, 44, 70, 73, 88, 162, 219, 241, 282, 461, 489, 548, 622, 644, 681, 707, 776, 799, 780; methods of determining, 290, 291, 298, 305.

— in Arizona, 115; in Canada, 494; in England, 677; in Germany, 56, 424; in Holland, 608; in New S. Wales, 618; in Mauritius, 218; in Switzerland, 145.

—, Russian book on, new edition of, 245.

—, Swiss manual of, 324.

—, work on, in Britain in 1932-3, 422; in Egypt, 741; in Spain, 424.

—, see also Immunity.

— protection, economic aspects of, in Germany, 380.

— services in Rumania, 49.

— quarantine, fusion of U.S. Bureau of, with U.S. Bureau of Entomology, 64.

—, see also Legislation.

*Plantago major*, celery yellows can infect, 313.

Plantain (*Musa paradisiaca*), *Rhinotrichum* on, in Sierra Leone, 428.

*Plasmodiophora brassicae* on cabbage, control, 277, 278, 545, 732, 807; method of infection by, 206; occurrence in Germany, 545; in New Zealand, 278, 732; in U.S.A., 148, 206, 807; in U.S.S.R.,

277; studies on, 206, 277; varietal resistance to, 148, 277.

[*Plasmiodiophora brassicae*] on cauliflower in England and Wales, 2; in Germany, 545.

— on crucifers, control, 414, 485; English translation of booklet on, 485; host range of, 414; occurrence in France, 485; in U.S.A., 206.

— on marrow-stem kale in Scotland, 557.

— on radish in U.S.A., 206.

— on rape in New Zealand, 278; in U.S.A., 151.

— on swede in Jersey, 493; in U.S.A., 148; in Wales, 808; varietal susceptibility to, 148, 485.

— on turnip in U.S.A., 148, 206.

*Plasmopara viticola* on vine, breeding against, 285; control, 10, 47, 49, 75, 77, 79, 244, 420, 421, 424, 454, 556, 557, 674, 675, 740, 814; factors affecting, 75, 77, 325, 420, 424; forecasting attacks of, 420; occurrence in Canada, 324; in France, 75, 77, 244, 420, 421, 454, 556, 674, 675, 740, 814; in Germany, 79, 285, 557; in Italy, 75, 424, 640; in Malta, 618; in Rumania, 49; in Switzerland, 244; in Tanganyika, 679; in U.S.S.R., 10; in Venezuela, 398; in Victoria, 814; phenology of, 10, 75, 77, 421; study on, 421.

*Platanus*, (?) bacterial disease of, in U.S.A., 409.

—, burning-back of, in Australia, 520.

—, *Ceratostomella* on, in U.S.A., 408.

—, *Gnomonia veneta* on, in U.S.A., 203.

—, *Poria subacida* on, in U.S.A., 805.

—, *occidentalis*, *Gloeosporium nervisequum* on, in the Argentine, 15.

*Plenodomus meliloti* on lucerne in Canada, 175.

— on *Melilotus alba* and *M. officinalis* in Canada, 175.

*Pleocysta sacchari* on sugar-cane in U.S.A., 656.

*Pleolpidium* parasitizing *Phytophthora* in U.S.A., 195.

*Pleospora* on *Rhododendron* in Germany, 173.

— on wheat in Algeria, 91.

— *alternariae* on tobacco in U.S.A., 724.

— *herbarum* in the air of British apple orchards, 369.

—, inversion of sucrose by, 124.

— *lycopersici* on tomato in U.S.A., 799; *Macrosporium sarcinaeforme* conidial stage of, 799.

*Pleurographium*, separation of, from *Graphium*, 703.

*Pleuroplaenoma punicae* on pomegranate in India, 323.

*Plourightia trifolii* synonym of *Cymadodthea trifolii*, 367.

*Plum* (*Prunus domestica*), *Bacterium* on, causing leaf spot, in U.S.A., 319.

—, *pruni* on, in Queensland, 641; in U.S.A., 178.

—, *Botrytis cinerea* on, in England, 641.

— breakdown in S. Africa, 321.

[Plum], *Byssochlamys fulva* on, in England, 775.

— canker in England, 617.

—, *Cladosporium condylonema* on, in Belgium, 679.

—, *Ciboria aestivalis* on, in New S. Wales, 704.

—, *Coniothyrium* on, in Canada, 44, 177.

—, *Dibotryon morbosum* on, control, 773; factors affecting, 772; *Hormodendrum* stage of, 593, 772; occurrence in Canada, 43, 177, 593, 772; overwintering of, 43; studies on, 177, 593, 772; *Trichothecium roseum* parasitizing, 177.

— diseases, control in Morocco, 517; in U.S.A., 768.

—, dying-off of, see Leptonecrosis of.

—, *Fomes pomaceus* on, in England, 375.

—, heat crinkle of, in Australia, 520.

—, *Lambertella corni-maris* can infect, 451.

—, Leptonecrosis of, in Italy, 320, 374, 455, 800; wrongly attributed to *Ceratostomella ulmi*, 800.

—, little leaf of, control, 43, 176, 767, 768; 'corral spot sickness' may be identical with, 767; factors affecting, 449; occurrence in S. Africa, 42; in U.S.A., 176, 449, 767, 768; *Sclerotinia laxa* in relation to, 449.

—, — peach disease affecting, in U.S.A., 682, 704.

—, *Monilia oregonensis* on, in Canada, 495.

—, mosaic of, control, 316; occurrence in Bulgaria, 316, 368; Czecho-Slovakia, England, Holland, and U.S.A., 368; transmission of, by *Anuraphis padi*, 368; by budding, 368; to apple, 316; to cherry and peach, 368.

—, *Mucor* on, in England, 641.

—, peach yellows affecting, in U.S.A., 682, 704.

—, *Penicillium* on, in England, 641.

—, physiological disease of, in Egypt, 177.

—, *Polystigma rubrum* on, in Bulgaria, 320; in Hungary, 773.

—, pox, see Plum mosaic.

—, *Pseudomonas mors-prunorum* and *P. prunicola* on, in England, 319.

—, *Sclerotinia fructigena* on, in England, 641; (?) in U.S.S.R., 704.

—, — *laxa* on, control, 593, 641, 703; notes on, 449, 593; occurrence in England, 593, 641; in Tasmania, 703; (?) in U.S.A., 449; (?) in U.S.S.R., 704.

—, *Stereum purpureum* on, in England, 772.

— storage rot in England, 322.

—, wilt, see Leptonecrosis of.

*Plumbago capensis*, *Omphalia flavida* can infect, 184.

*Poa annua*, *Corticium fuciforme* on, in Great Britain, 587.

—, *Puccinia lolii* can infect, 435.

—, *pratensis*, *Fusarium poae* on, in Germany, 512.

—, *Puccinia* on, sporulation in, 52.

—, *sandbergii*, *Cercosporaella herpotrichioides*

and *Wojnowicia graminis* on, in U.S.A., 569.

*Podocarpus elongata*, *Pestalozzia podocarpi* on, in Scotland, 136.

— *madagascariensis*, *Corynelia uberata* on, in Madagascar, 333.

*Podonectria coccicola* on *Lepidosaphes beckii* in the Argentine, 98.

*Podosphaera leucotricha* on apple, control, 9, 315, 771, 773; nature of resistance to, 711; note on, 316; occurrence (?) in England, 9; in Finland, 771; in Hungary, 639, 773; in Peru, 315; in Western Australia, 315; varietal resistance to, 639.

*Pogostemon comosus*, 'lepra' disease of, in Sumatra, 153.

*Poinciana regia*, *Ganoderma lucidum* on, in Japan, 532.

*Polygonum aviculare*, (?) *Erysiphe polygoni* on, in U.S.A., 288.

— *convolvulus*, *Cercospora beticola* on, in U.S.A., 149.

*Polyopeus* in the air of British apple orchards, 369.

*Polypodium vulgare*, *Corticium anceps* can infect, 797.

*Polyporaceae* of Bengal, 193; of Brazil, 332; of New York State, 193.

*Polyporus anarus* on *Libocedrus decurrens* in U.S.A., 205.

— *borealis* on pine and spruce in Sweden, 803.

— *calcuttensis*, secondary spore formation in, 611.

— *coffeae* in Brazil, 333.

— — on coffee in the Cameroons, 31, 357; compared with *Bornetina corium* on vine, 357.

— *fumosus* on walnut in U.S.S.R., 62.

— *gilvus* f. *licnoides*, distribution of, in India, 795.

— *ochroleucus*, secondary spore formation in, 611.

— *rugosus* synonym of *Ganoderma rugosum*, 532.

— *schweinitzii* on conifers in Great Britain and Sweden, 803.

— *squamosus*, distribution of, in India, 794.

— *sulphureus*, distribution of, in India, 795.

— — on chestnut and yew in U.S.S.R., 62.

*Polystictus versicolor* on timber in Great Britain, 413.

— — use of, in tests of timber preservatives, 412.

*Polystigma ochraceum* on almond in Tunis, 429.

— *rubrum* in the air of orchards in Rumania, 50.

— — on plum in Bulgaria, 320; in Hungary, 773.

*Polystigmella rubra*, see *Polystigma rubrum*.

Pomegranate (*Punica granatum*), *Amphi-chaeta punicae* on, in India, 379.

— *Pleuroplaconema punicae* on, in India, 323.

[Pomegranate], *Zythia personiana* on, in China, 778.

Pomogreen dusting sulphur, use of, against *Puccinia malvacearum* on hollyhock, 38.

Poplar (*Populus*) canker in Belgium, 478; in England and Scotland, 264.

—, *Cytospora* on, in Belgium, 478.

—, *Diplodia gongrorena* on, in Austria, 134.

—, *Dothiorella gregaria* on, in the Argentine, 15.

—, *Hendersonula toruloides* on, in Cyprus, 83; *Torula* form of, 83.

—, little leaf of, in U.S.A., 768.

— mosaic in Bulgaria, 462.

—, *Naemospora* on, in Cyprus, 742.

—, *Nectria coccinea* var. *sanguinella* on, in Germany, 478.

—, *ditissima* on, in Belgium, 478.

—, *galligena* on, in U.S.A., 794.

—, *Phyllosticta populina* on, in Italy, 478; synonymy of, 479.

—, (?) *Pseudomonas saliciperda* on, in U.S.A., 409.

—, *Septoria populi* on, in the Argentine, 15.

—, *Taphrina aurea* on, in Italy, 665.

—, *Tuber magnatum* in symbiosis with, in Italy, 783.

—, *Valsa* on, in Belgium, 478.

*Populus*, see Poplar.

— *deltoides*, see Cottonwood.

— *tremula*, see Aspen.

*Poria friesiana* on orange in Cyprus, 83.

— *hypolateritia* on tea and *Tephrosia vogelii* in Ceylon, 657.

— *incrassata*, use of, in tests of timber preservatives, 276.

— *subacida* on *Acer balsamea*, *A. saccharum*, ash, birch, chestnut, larch, lime, oak, pine, *Platanus*, *Pseudotsuga taxifolia*, (?) *Thuja occidentalis*, *T. plicata*, and walnut in U.S.A., 805.

— *vaporaria* on pine and spruce in Sweden, 803.

— — on timber, action of, 69; resistance of, to desiccation, 267.

— — use of, in tests of timber preservatives, 412.

*Posadasia capsulata* on man, 100; as a type of mycosis, 631; comparison of, with *Cryptococcus farcinosus* and *C. muris*, 235; with *Sepedonium*, 235; cultural characters of, 445; occurrence in U.S.A., 446, 582; studies on, 445, 582.

— *pyriformis* on man in U.S.A., (?) 235, 582, 760; referred to *Sepedonium*, 235, 760; renamed *Histoplasma pyriformis*, 760; studies on, 582, 760.

Potash alum, use of, against tomato fruit rots, 263.

— deficiency in relation to *Alternaria solani* on potato, 565; to bacterial blights of beans, 565; to osmosis and permeability, 572; to *Peronospora parasitica* on cabbage, 565; to white spotting of clover, grasses, and oats, 572; to yellowing of beet in Germany, 417.

[Potash] hunger of cotton in U.S.A., 629.  
 Potassium arsenite and chlorate, use of, in eradicating spiked sandal, 539.  
 — iodide, artificial production of X-bodies in beet by, 116.  
 — — impregnated wraps, use of, against *Botrytis cinerea* on grapes, 214.  
 — permanganate in relation to inactivation of viruses, 782.  
 — —, use of, against *Armillaria mellea* in orchards, 451; against fruitlet black rot of pineapple, 182; against rhizome rot and scorch of iris, 698.  
 — — impregnated wraps, use of, against *Botrytis cinerea* on grapes, 214, 491.  
 — salicylate, *dosis tolerata* of, to wheat, 228.  
 — tartrate, use of, with Burgundy mixture, 76.  
 —, see also Fertilizers.  
 Potato (*Solanum tuberosum*), acropetal necrosis of, relation of, to potato streak, 251.  
 —, *Actinomyces scabies* on, control, 55, 118, 150, 330, 381, 528, 716; factors affecting, 118; genetics of resistance to, 389; legislation against, in Egypt, 544; in Sweden, 672; occurrence in Holland, 528; in Mauritius, 84; in New S. Wales, 55; in Sweden, 340, 672; in U.S.A., 118, 150, 381, 389, 716; in U.S.S.R., 330; transmission of, by *Epitrix cucumeris*, 118, 716; varietal susceptibility to, 118.  
 —, *Aecidium cantensis* on, in S. America, 325.  
 —, *Alternaria solani* on, control, 649; effect of, on yield, 679; factors affecting, 565; occurrence in Belgium, 679; in Great Britain, 330; in India, 649; in U.S.A., 565; varietal susceptibility to, 330.  
 — anecrotic mosaic, see aucuba mosaic of.  
 —, aster yellows can infect, 312.  
 — aucuba mosaic, anatomical differentiation of, 116; effect of, on physiology of host, 52; occurrence in U.S.S.R., 52, 116; serological differentiation of, 385.  
 —, *Bacillus phytophthorus* on, varietal resistance to, 525.  
 — bacterial diseases of, in Sweden, 672; legislation against, in Sweden, 672.  
 —, *Bacterium formosanum* can infect, 738.  
 —, — *rubefaciens* on, not accepted as the cause of spraing, 253.  
 —, — *solanacearum* on, in Brazil, 790; in U.S.A., 85, 563.  
 — basal roll in Germany, 387.  
 —, beet curly top affecting, in U.S.A., 171.  
 — calico in U.S.A., 786; transmission of, by *Macrosiphum gei*, 787; to chilli, eggplant, *Datura stramonium*, *Petunia*, and tomato, 787.  
 —, *Cercospora concors* on, in Denmark, 741.  
 —, — *solanicola* on, in Brazil, 87.  
 —, *Colletotrichum atramentarium* on, in New Zealand, 466.  
 — [Potato], concentric necrosis of, comparison of, with medullary necrosis, 253; synonymy of, 253.  
 —, *Coniosporium arundinis* on, in New Zealand, 466.  
 —, *Corticium rolfsii* on, in India, 125. (See also *Sclerotium rolfsii* on.)  
 —, — *solani* on, control, 55, 118, 150, 497, 527, 607; factors affecting, 118, 150, 208, 497, 527; losses caused by, 423; notes on, 423; occurrence in Canada, 607; in England, 423; in Holland, 528; in New S. Wales, 55; in New Zealand, 466; in N. America, 207; in Poland, 527; in U.S.A., 118, 150, 497, 563; strains of, 207; study on, 207; varietal susceptibility to, 563.  
 — crinkle, breeding against, 784; control, 715, 784; effect of, on host protoplasm, 465; factors affecting, 387; 'frisolée' synonymous with, 246; occurrence in Belgium, 326; in Germany, 387; in Italy, 328; in New Zealand, 715; in Scotland, 784; in U.S.A., 147, 784; relation of, to potato viruses X and Y, 186, 246; study on, 784; transmission of, to tobacco, 326, 681; tuber-indexing against, 147.  
 — — A in Italy, 786.  
 — — mosaic in Australia, England, Ireland, and Japan, 524; in U.S.A., 681; transmission of, to *Datura*, tobacco, and other Solanaceae, 681.  
 — curly dwarf in U.S.A., 784.  
 — degeneration, biochemistry of, 650, 785; control, 328; ecological study of, 650; etiology of, 54, 328, 387; factors affecting, 77, 250, 328, 650; methods of detecting, from the tubers, 78, 388, 785; occurrence in Estonia, 785; in France, 77, 250; in Germany, 54, 78, 328, 387, 650, 785; in Italy, 328; studies on, 387, 650, 785.  
 — diseases in Canada, 465; in Denmark, 558; in England, 250; in France, 786; in Holland, 604; in U.S.A., 784.  
 — dwarfing in Italy, 786.  
 —, 'Eisenfleckigkeit' of, factors affecting, 717; hereditary type of, synonymous with pseudo-net necrosis, 253; occurrence in Germany, 389, 717; study on, 717.  
 —, (?) *Erysiphe cichoracearum* on, in Cyprus, 83.  
 — 'frisolée', synonymous with crinkle, 246.  
 —, *Fusarium* on, legislation against, in Sweden, 672; occurrence in New Zealand, 466; in Sweden, 672.  
 —, — *orthoceras* on, in New Zealand, 466.  
 —, — *solani* on, in India, 472.  
 —, — var. *eumarti* on, 334.  
 —, *Geomyces* on, in Canada, 760.  
 —, 'healthy potato virus' of, affecting tomato in Canada, 261; in U.S.A., 661; factors affecting, 404; nature of, 186; occurrence in Australia, Brazil, Bulgaria, England, Germany, Holland, Irish Free State, Japan, U.S.A., and U.S.S.R., 523; relation of, to potato

mosaic, 261; to potato virulent latent virus, 261; to tobacco mottle, 261, 660; to tomato streak, 201, 661; serological relationships of, 385.

[Potato], *Helicobasidium purpureum* can infect, 730.

—, 'Kringerigkeit' and 'kringerigheid' of, synonyms of potato concentric necrosis, 253.

— latent virus, see 'healthy potato virus' of.

— leaf roll, anatomical differentiation of, 116; control, 715, 784; effect of, on physiology of host, 52, 190, 465; on yield, 786; factors affecting, 387; history of research on, 54; method of diagnosing, from the tuber, 388; occurrence in Brazil, 524; in France, 327; in Germany, 190, 387, 388, 650; in Italy, 328, 781, 786; in New Zealand, 715; in U.S.A., 496, 784; in U.S.S.R., 52, 117; relation of, to potato net-necrosis, 253; to virus disease of *Cestrum parqui*, 781; serological study on, 327; study on, 190; transmission of, by *Aphis abbreviata*, 496.

—, *Macrophomina phaseoli* on, in Cyprus, 83.

—, magnesium deficiency disease of, in U.S.A., 645, 649.

—, maladie des tâches en couronne of, synonym of concentric necrosis, 253.

—, 'medullary necrosis' of, in Holland, 252; potato 'rusty spot' renamed, 253.

— mosaic, anatomical differentiation of, 116; control, 715, 784; effect of, on mycorrhiza, 602; on physiology of host, 52; on yield, 786; factors affecting, 786; method of diagnosing, from the tuber, 388; occurrence in Austria, 464; in Belgium, 649; in Canada, 261, 605; in Estonia, 785; in France, 602; in Germany, 388, 650; in Irish Free State, 604; in Italy, 328, 781, 786; in New Zealand, 715; in Switzerland, 786; in U.S.A., 147, 496, 784; in U.S.S.R., 52, 116; relation of, to pea mosaic virus 2, 782; to potato spot necrosis, 130; to streak, 116; to potato X virus, 261; to virus disease of *Cestrum parqui*, 781; transmission of, by *Aphis abbreviata*, 496; tuber-indexing against, 147; types of, 116, 130, 464, 604, 605, 649, 782, 784; varietal resistance to, 147, 496.

— mottle, see 'healthy potato virus' of.

— mycorrhiza inhibited by mosaic, in France, 602.

— 'necrosi pseudoreticolare', synonym of potato pseudo-net necrosis, 253.

— necrosis in Italy, 328.

— net necrosis of, attributed to potato leaf roll virus, 353; comparison between concentric necrosis and, 253; transmission of, by grafting and by *Myzus persicae*, 253.

—, *Oidium* on, in Cyprus, 742.

—, *Oospora pustulans* on, in New Zealand, 466.

— 'Pfropfenbildung' synonym of potato concentric necrosis, 253.

[Potato], *Phytophthora* from *Nigella damascena* can infect, 147.

—, — *infestans* on, breeding against, 391, 788; control, 13, 84, 189, 391, 465, 492, 495, 527, 606, 789; effect of, on yield, 392; factors affecting, 189, 325, 391; legislation against, in Sweden, 672; occurrence in Austria, 465; in Canada, 324; in England, 676, 789; in France, 189; in Germany, 390, 527, 606; in Holland, 13, 715; in Jersey, 492, 527; in Mauritius, 84; in Scotland, 789; in Sweden, 672; in U.S.A., 85, 391, 495, 606, 789; phenology of, 189, 676, 715; specialization in, 390; spray warnings against, 13, 495; studies on, 189, 390; varietal and specific resistance to, 390, 496, 606; viability of, 391.

—, — *parasitica* on, 194.

—, 'pseudo-net necrosis' of, comparison between concentric necrosis and, 253; relation of, to potato interveinal mosaic, 605; synonymy of, 253.

—, psyllid yellows of, in Canada and U.S.A., 117; transmission of, by *Paratriozia cockerelli*, 117.

—, *Puccinia pittieri* on potato in S. America, 325.

—, *Pythium ultimum* on, in Canada, 605.

— ring spot in Australia, Brazil, England, Germany, Holland, Irish Free State, Japan, U.S.A., and U.S.S.R., 523; serological studies on, 385, 782; transmission of, to tobacco, 660.

—, *Sclerotinia sclerotiorum* on, in U.S.A., 563.

—, *Sclerotium* on, in U.S.A., 221.

—, — *rolfsii* on, in India, 560. (See also *Corticium rolfsii* on.)

— seed certification in Canada, 494; in Germany, 651; in New Zealand, 715; in U.S.A., 714.

— seed piece decay of, in U.S.A., 191.

— spindle sprout in New Zealand, 715.

— tuber in U.S.A., 784.

—, *Spondylocladium atrovirens* on, in the Argentine, 223.

—, *Spongospora subterranea* on, legislation against in Egypt, 544; in Sweden, 672; in U.S.S.R., 336; occurrence in Sweden, 672; in U.S.S.R., 330; zoospores of, 255.

— spot necrosis, relation of, to potato rugose mosaic, 130.

— sprouting, factors affecting, 117; notes on, 117; occurrence in England and Europe, 117; synonym of potato concentric necrosis, 253.

— stipule streak in New Zealand, 715.

— streak, anatomical differentiation of, 116; control, 55; latency of, 55; occurrence in Belgium, 251, 649; in Cyprus, 83; in Germany, 650; in Holland, 54; in Ireland, 524, 604; in U.S.A., 496; in U.S.S.R., 116; purification of virus of, 649; relation of, to healthy potato virus, 385; to potato acropetal necrosis, 251; to potato interveinal mosaic, 604; to potato rugose mosaic, 116; studies on, 54, 251, 649; transmission of, by

*Aphis abbreviata*, 496; by insects and grafting, 649; by *Myzus persicae*, 251; by rubbing, 251, 649; by wounding, 251; to *Datura stramonium*, 251; to tobacco, 251; types of, 251, 524, 604, 649; varietal susceptibility to, 55.

[Potato], *Synchytrium endobioticum* on, breeding against, 463, 788; control, 465, 715; dissemination of, 787; factors affecting, 650; genetics of resistance to, 252, 389, 465, 788; incipient infections of, 55; legislation against, in Austria, 64; in Denmark, 544, 788; in Egypt, 544; in Germany, 400, 736, 815; in Norway, 64, 788; in Sweden, 672, 788; in U.S.S.R., 336; occurrence in Austria, 464; in Czecho-Slovakia, 650; in Denmark, 741, 788; in England, 55; in Finland, 788; in Germany, 78, 389, 463, 651, 715, 815; not in Malta, 618; in Norway, 251; in Poland, 526; in Sweden, 672, 787; studies on, 251, 389, 465, 526, 788; varietal resistance to, 55, 78, 252, 400, 465, 526, 651, 788.

—, tobacco mosaic can infect, 198.

—, — veinbanding spreading from, (?) in S. Rhodesia, 677; in U.S.A., 685, 723.

—, tomato bumpy top can infect, 800.

—, tuber blotch virus, a constituent of interveinal mosaic in Irish Free State, 605.

—, veinbanding, infection radius of, 190; occurrence in Australia, Brazil, Bulgaria, England, Germany, and Holland, 524; in U.S.A., 190, 287; relation of, to cucumber mosaic virus, 782; to potato virus Y, 246, 524; to Valjeau's tobacco virus 10729, 782; serological studies on, 385, 782; study on, 524; varietal resistance to, 287.

—, *Verticillium albo-atrum* on, in New Zealand, 466, 717.

—, 'virulent latent' virus of, affecting tomato in Canada, 261; relation of, to 'healthy potato virus', potato virus X, and tobacco ring spot, 261.

—, virus diseases, breeding against, 222; classification of, 116; comparative studies on, 523; control, 525, 714, 784; masking of symptoms of, 714; occurrence in Australia, Brazil, and Bulgaria, 523; in Canada, 465, 525; in England, Germany, Holland, Irish Free State, and Japan, 523; in U.S.A., 222, 714, 784; in U.S.S.R., 117, 523; *Pseudocommis vitis* (?) identical with intracellular bodies in, 117; recent work on, 54; tuber-indexing against, 525, 714; varietal resistance to, 222.

—, — A, relation of, to potato mosaic, 186; to potato X virus, 186.

—, — D in England, 329; serological studies on, 713; transmission of, to *Datura stramonium*, *Nicotiana glutinosa*, tobacco, and tomato, 329.

—, — M 29, probably a blend of M 23 and R 77, 649.

—, — X, in Belgium, 185; in Canada, 605; in Germany, 388; protective action of, 330, 388; relation of, to 'healthy potato virus', 661; to peony virus disease, 199; to potato crinkle, 186, 246; to potato interveinal mosaic, 605; to potato virulent latent virus, 261; to tomato streak (mixed virus), 261, 262; serological studies on, 185, 713; transmission of, by grafting and rubbing, 388; by sap, 605; to *Datura stramonium* and *Nicotiana glutinosa*, 262, 713; to tobacco, 185, 186, 262, 326, 388, 713; to tomato, 262; use of, in the differentiation of related viruses, 326; virus of, affecting tomato in Canada, 261.

[Potato virus] Y, cytological effects of, 246; notes on, 186; occurrence in Belgium, 185; in France, 327; in Germany, 388; relation of, to potato crinkle, 186, 246; to tobacco veinbanding, 246, 524; serological studies on, 185, 327; transmission of, by *Myzus persicae*, to tobacco, 186, 246; to other Solanaceae, 246.

—, witches' broom of, in Italy, 786; in U.S.A., 784.

—, wound cork formation in, effect of ultra-violet rays on, 467.

—, yellow dwarf in U.S.A., 147, 190; transmission of, by *Myzus persicae*, 190.

Powellizing process of timber preservation, 138.

Pox of plum and other stone fruits, see Mosaic of.

— of tobacco in Java, 533; transmission of, by *Myzus persicae*, 533.

Preparation 413a, use of, against *Bacterium malvacearum* on cotton, 82.

*Primula*, tomato spotted wilt can infect, 404.

— obconica, *Bacterium tumefaciens* <sup>not</sup> *ion*, 499.

—, (?) cucumber mosaic affecting, in England, 635; transmission of, to cowpea, *Nicotiana glutinosa*, *Primula sinensis*, and tobacco, 635.

— sinensis, (?) cucumber mosaic can infect, 635.

Primus seed disinfection apparatus, 519.

*Proteomyces*, *Geotrichoides* referred to, 170.

*Proteus vulgaris*, see *Bacillus proteus vulgaris*.

Protocatechuic aldehyde, effect of, on growth of *Aspergillus niger*, *Botrytis allii*, *Colletotrichum cincinans*, and *Gibberella saubinetii*, 553.

*Protopomycopsis* on *Heterodera schachtii* in Czecho-Slovakia, 33.

*Protoparops sexta* transmitting *Bacterium angulatum* on tobacco, 335.

Prune, see Plum.

*Prunus*, *Bacterium pruni* on, in Brazil, 87.

—, mosaic of, in Bulgaria, 316.

—, *Ochropsora sorbi* on, in England and Wales, 492.

— *americana* in relation to peach yellows, 705.

— *amygdalus*, see Almond.

— *armeniaca*, see Apricot.

— *avium*, see Cherry.

[*Prunus*] *cerasus*, see Cherry.  
 — *domestica*, see Plum.  
 — *insititia*, see Damson.  
 — *mume*, *Ganoderma applanatum* on, in Japan, 532.  
 — *padus*, *Fusarium lini* on, in Switzerland, 310.  
 — *pennsylvanica*, *Coniothyrium* on, in Canada, 44.  
 — *persica*, see Nectarine, Peach.  
 — *salicina*, little peach disease and peach yellows affecting, in U.S.A., 705.  
*Psalliole campestris*, see Mushrooms.  
*Pseudohaplosporella aurantiorum* identical with *Botryodiplodia lecanidion*, 793.  
*Pseudobalsamia microspora* on mushrooms, 739.  
*Pseudococcus brevipes*, fungal and bacterial symbionts of, 379, 580.  
 — — in relation to green spot of pine-apple, 379; to *Penicillium* on pine-apple, 216; to pineapple mealy bug wilt in Hawaii, 455, 457; in Mauritius, 84; in the Philippines, 457, 643.  
 — *citri* in relation to *Polyporus coffeeae* on coffee, 31.  
*Pseudocommis vitis* (?) identical with intracellular bodies in virus diseased potatoes, 117.  
*Pseudomonas alfalfa* on lucerne in U.S.A., 766.  
 — *ananas*, see *Bacterium ananas*.  
 — *campestris* on cabbage in Bulgaria, 1; in Sumatra, 153.  
 — — on cauliflower, kohlrabi, and rape in Bulgaria, 1.  
 — *carotae* on carrot in U.S.A., 211.  
 — *cerasi*, *Bacterium holci* and *Bacterium trifoliiorum* synonyms of, 16.  
 — — on cherry, 16.  
 — *citri* on citrus, control, 64, 145; legislation against, in Egypt, 544; in U.S.A., 64; non-occurrence in S. Africa, 426; occurrence in Ceylon, 145; in U.S.A., 64.  
 — *citripouteale* on citrus, legislation against, in Egypt, 544.  
 — *endiviae* can infect *Delphinium*, 16.  
 — — on endive, comparative studies on, 16.  
 — — on lettuce in Germany, 418.  
 — (?) *intybi* can infect chicory, 418.  
 — (?) — on endive and lettuce in Germany, 418; serological affinity between *Bacterium lacrymans*, *Bact. tabacum*, *Pseudomonas syringae*, and, 418.  
 — *lignicola* on elm, 536.  
 — *mors-prunorum* can infect peach, 319.  
 — — on plum in England, 319.  
 — —, toxicity of bactericides to, 641.  
 — *papulans* can infect peach, 319.  
 — — on apple in U.S.A., 319.  
 — *prunicola* can infect peach, 319.  
 — — on plum in England, 319.  
 (?) — *saliciperda* on poplar in U.S.A., 409.  
 — — on *Salix*, legislation against, in U.S.A., 400; occurrence (?) in U.S.A., 409.  
 — *savastanoi* on olive, control, 644, 706; factors affecting, 643, 686; occurrence in Cyprus, 706; in U.S.A., 643; study on, 644; varietal susceptibility to, 644.  
[*Pseudomonas savastanoi*] var. *nerii* can infect olive, 686.  
 — — — on oleander, 686.  
 — *syringae* can infect lettuce, 418; peach, 319.  
 — — — on avocado pear in U.S.A., 707.  
 — — — on *Chrysanthemum indicum* in Germany, 38, 418.  
 — — — on lilac, comparative studies on, 16; occurrence in Belgium, 447; in Germany, 418; in Holland, 319; in U.S.A., 319.  
 — *tolaasii* on mushrooms in Great Britain, 346; in U.S.A., 146.  
 — *tritici* on wheat (?) in Cyprus, 742; in India, 571.  
 — *uniformica* on pear, comparative studies on, 16.  
'Pseudo-net necrosis' of potato, comparison between concentric necrosis and, 253; relation of, to potato interveinal mosaic, 605; synonymy of, 253.  
*Pseudoperonospora cubensis* on cucumber in S. Africa, 426; in U.S.A., 683.  
 — *humuli* on hops in England, 792; in U.S.A., 191.  
*Pseudopeziza jonesii* on lucerne in Canada, 494; *Pyrenopeziza medicaginis* synonym of, 494.  
 — *medicaginis* on lucerne in France, 424.  
 — *ribis* on currants in U.S.A., 377.  
 — — on gooseberry in U.S.A., 377, 774.  
 — *tracheiphila* on vine in Germany, 285.  
 — *trifolii* on clover in Estonia, 241.  
*Pseudotarsonemoidea innumerabilis* in relation to *Ceratostomella ulmi* on elm, 665.  
*Pseudotsuga*, *Mycelium radicum nigrostriatum* on, forming mycorrhiza in Sweden, 187.  
 — *taxifolia*, (?) *Diplodia pinea* on, in New Zealand, 65.  
 — —, *Phomopsis pseudotsugae* on, in England, 264.  
 — —, *Poria subacida* on, in U.S.A., 805.  
 — —, *Rhabdoctine pseudotsugae* on, in Holland, 483.  
 — —, *Stereum sanguinolentum* on, in U.S.A., 728.  
 — — var. *viridis*, *Adelopus* (?) *balsamicola* on, in Austria, 729.  
*Psidium guajava*, see Guava.  
Psoriasis of citrus, suggested virus nature of, 505.  
 — of orange, 627.  
*Psychotria*, bacterial leaf nodules of, 154.  
Psyllid yellows of potato in Canada and U.S.A., 117; transmission of, by *Paratriozza cockerelli*, 117.  
 — — of tomato in Canada, 117.  
*Pterularia aquilinum*, *Corticium* on, in Scotland, 797.  
 — —, *anceps* on, in Germany, 797; in Northern Ireland, 796, 797; in Scotland, 797.  
*Pterocarpus indicus*, *Fomes noxius* on, in Java, 153.

*Puccinia* on cereals, control, 18, 499; factors affecting, 18; losses caused by, 18, 19; occurrence in Austria, 19; in U.S.A., 499; in U.S.S.R., 18.

— on *Festuca pratensis*, *F. rubra*, oats, and *Poa pratensis*, sporulation in, 52.

— on wheat in Rhodesia, 678; sporulation in, 52.

— *agropyri* can infect barley, grasses, oats, rye, and wheat, 501.

— on *Agropyron semicostatum* in Japan, 501.

— (?) *allii* on onion in Japan, 735.

— *anomala* can infect *Ornithogalum fimbriatum* and *O. narbonense*, 292.

— on barley, factors affecting, 624; occurrence in the Argentine, 27; in Germany, 624; in U.S.A., 624; in U.S.S.R., 292; physiologic forms of, 27, 624.

— *antirrhinum* *Antirrhinum glutinosum* in England, 446.

— on *Antirrhinum majus*, breeding against, 172, 498; control, 239, 240; factors affecting, 747; notes on, 239, 560; occurrence in Bermuda, 239, 560; in Denmark, 239; in England, 239, 446; in France, 239, 645; in Germany, 239, 364; (?) in Holland, 12; in U.S.A., 172, 239, 498; varietal resistance to, 364, 498.

— on *Antirrhinum molle* in England, 446.

— on *Antirrhinum orontium* in France, 364.

— *arachidis* on groundnut, 212.

— *asparagi* on asparagus in Germany, 489, 554, 811.

— *coronata*, see *P. lolii*.

— *culmicola* considered to be form of *P. graminis*, 796.

— on *Agropyron semicostatum*, barberry, and rye in Japan, 796.

— *glumarum*, *Aecidium valerianellae* (?) aecidial form of, 292.

— on barley in the Argentine, 27; in France, 20.

— on *Hordeum euclastum* and *H. spontaneum* in U.S.A., 27.

— on wheat, breeding against, 227, 294, 567; control, 293; effect of, on yield, 18; factors affecting, 20, 214, 423, 748; genetics of resistance to, 294; germination of teleutospores of, 619; method of determining losses caused by, 291; occurrence in the Argentine, 500; in Austria, 19, 748; in France, 20, 77, 423; in Germany, 294; in Italy, 293, 619; in Kenya, 427; in Madagascar, 87; in Rumania, 214; in U.S.S.R., 18, 225, 291; overwintering of, 20; physiologic forms of, 20; varietal resistance to, 77, 215, 225, 431, 500.

— *goughensis* on *Apium goughense* in Gough Island (Antarctic), 258.

— *graminis* on *Agropyron scabrum* in New S. Wales, 619.

— on barberry, early work on heteroecism in, 350; legislation against, in U.S.A., 63, 672; notes on, 88, 215; occurrence in Germany, 88, 350; in New S. Wales, 619; in Rumania, 215; in U.S.A., 219; in U.S.S.R., 291; saltation in, 155; specific and varietal resistance to, 63, 672.

[*Puccinia graminis*] on barley in Canada, 225; in U.S.A., 687.

— on cereals, barberry eradication against, 18, 49, 64, 219, 568, 815; early work on heteroecism in, 350; losses caused by, 219; occurrence in Germany, 350, 568; in Rumania, 49; in U.S.A., 64, 219.

— on oats, control, 350; factors affecting, 225, 350, 687; genetics of resistance to, 434; occurrence in Canada, 225; in U.S.A., 350, 434; in U.S.S.R., 18; studies on, 225, 687; varietal resistance to, 350, 573.

— on *Phleum pratense*, 687.

— on rye in Germany, 88; in U.S.S.R., 18.

— on wheat, artificial production of an epidemic of, 226; breeding against, 225, 427, 431, 567, 619; control, 18, 293, 350, 815; by dusting, 18; effect of, on yield and weight of grain, 568; factors affecting, 20, 88, 214, 225, 226, 293, 350, 423, 568, 687, 747; genetics of resistance to, 155, 619; legislation against, in New S. Wales, 815; losses caused by, 18, 88; nature of resistance to, 225, 226, 293; occurrence in Austria, 19, 499; in Canada, 225, 226; in Europe, 88; in France, 77, 423; in Germany, 88; in Italy, 293; in Kenya, 226, 427, 431; in Madagascar, 87; in Mexico, 350; in New S. Wales, 618, 815; in Rumania, 214; in U.S.A., 350; in U.S.S.R., 18, 225; in Victoria, 568; overwintering of, 215, 499; physiologic forms of, 226, 350, 427, 431, 618; studies on, 155, 225, 226, 687; varietal resistance to, 77, 155, 215, 225, 226, 350, 431.

—, *P. culmicola* considered to be form of, 796.

— *helianthi* on sunflower, 747.

— *hibisciata*, see *P. schedonnardi*.

— *iris* on iris in England, 698; in Estonia, 530.

— *lolii* can infect *Anthoxanthum odoratum*, *Avena*, *Dactylis glomerata*, *Festuca octoflora*, *Lamarkia aurea*, *Phleum pratense*, and *Poa annua*, 435.

— on *Calamagrostis epigea* and *Festuca pratensis*, sporulation in, 53.

— on oats, breeding against, 148; control, 18; effect of, on physiology of host, 220, 300, 353, 567, 625; on yield, 353, 625; factors affecting, 53, 747; genetics of resistance to, 434; losses caused by, 18; method of estimating losses caused by, 291; occurrence in Canada, 149; in Kenya, 427; in Mexico, 149; in U.S.A., 148, 149, 220, 353, 434, 435, 567, 625; in U.S.S.R., 18, 291; physiologic forms of, 149, 220, 292, 435; sporulation in, 53; varietal resistance to, 18, 435.

[*Puccinia lolii*] on *Rhamnus* in U.S.A., 435; in U.S.S.R., 292.

— on *Rhamnus cathartica* and *R. lanceolata* in N. America, 149.

— *magnusiana* on *Phragmites* in Germany, 364.

— *malvacearum* on hollyhock in U.S.A., 38.

—, receptive hyphae of, 464.

— *maydis* can infect *Oxalis corniculata*, 292.

—, heterothallism in, 438.

— on maize, breeding against, 431, 626; factors affecting, 747; location of a gene for resistance to, 626; occurrence in Kenya, 431; in U.S.S.R., 292.

— on *Oxalis corniculata* var. *atropurpurea*, cytology of, 438.

— *menthae* on *Calamintha acinos*, *C. clinopodium*, *Mentha arvensis*, and *M. piperita* in Estonia, 530.

— on *Mentha villosa-nervata* in England, 791.

— on *Satureja hortensis* in Estonia, 530.

— *persistens* on *Agropyron repens*, *Thalictrum glaucum*, *T. minus*, and wheat in France, 645.

— *phelei-pratensis* on *Phleum pratense* in Rumania, 514.

— *phragmitis* on *Phragmites communis*, sporulation in, 53.

— *pittieri* on potato in S. America, 325.

— *porri* on *Allium schoenoprasum* in England, 423.

— (?) — on onion in Japan, 735.

— *pruni-spinosae* on *Anemone coronaria* in England, 676.

— *psidii* on *Eugenia malaccensis* in Jamaica, 792.

— on pimento in Jamaica, 666, 792.

— *purpurea* on sorghum in U.S.A., 258.

— *rhei-undulati* on *Rheum undulatum* and rhubarb in Japan, 719.

— *rubigo-vera* can infect *Agropyron*, *Bromus*, *Clematis virginiana*, *Elymus*, *Hordeum*, *Hystris*, *Impatiens biflora*, *Thalictrum dasycarpum*, *T. dioicum*, *T. fendleri*, *T. flavum*, *T. glaucum*, and *T. minus*, 746.

— on grasses in U.S.A., 746; physiologic specialization in, 746; *P. tomipara* not a synonym of, 746.

— *shedonnardi* on cotton in U.S.A., 348, 629.

— *schroeteri* on narcissus in England, 366.

— *secalina* on *Anchusa gmelini* and *A. officinalis* in U.S.S.R., 292.

— on rye, factors affecting, 156, 689, 750; occurrence in Austria, 156; in Germany, 300, 689; in Kenya, 427; in Lithuania, 750; in U.S.S.R., 292; overwintering of, 750; physiologic specialization in, 300; wheat varieties as differential hosts of, 300.

— *sorghi*, see *P. maydis*.

— *suaveolens* on *Cirsium arvense* in U.S.S.R., 52.

— *tomipara* can infect *Bromus purgans*,

*Thalictrum dasycarpum*, *T. dioicum*, *T. fendleri*, *T. flavum*, and *T. glaucum*, 747.

[*Puccinia tomipara*] on *Bromus altissimus* and *B. ciliatus* in U.S.A., 747.

— on grasses in U.S.A., 746; not a synonym of *P. rubigo-vera*, 746.

— *triticina* can infect *Aegilops crassa* and *A. cylindrica*, 292; barley, 225, 299; rye, 292; *Thalictrum*, 59, 292.

— on *Agropyron repens*, *Thalictrum glaucum*, and *T. minus* in France, 645.

— on wheat, breeding against, 225, 227, 497, 567; control, 293, 500; effect of infection by *Erysiphe graminis* on resistance to, 88; of, on physiology of host, 432, 567; on yield, 18, 432, 567; factors affecting, 18, 88, 156, 214, 497, 747, 748; genetics of resistance to, 227, 229; germination of teleutospores of, 619; method of determining losses caused by, 291; occurrence in Austria, 19, 156, 499, 500, 748; in France, 77, 645; in Germany, 227; in Hungary, 748; in Italy, 293, 619; in Japan, 59, 299; in Madagascar, 87; in Rumania, 214, 227; in U.S.A., 88, 229, 432, 497, 567; in U.S.S.R., 18, 225, 291, 292; overwintering of, 214, 499; physiologic forms of, 227, 497, 748; varietal resistance to, 77, 215, 225, 227, 432.

— *tubulosae* on eggplant in the Philippines, 608.

— on *Panicum sanguinale* in the Philippines, 608.

— *verruca* on *Centaurea scabiosa* in U.S.S.R., 494.

— on safflower in U.S.S.R., 493.

— *zoysiae* can infect *Paederia chinensis*, 796

— on *Zoysia japonica* in Japan, 796.

*Pueraria hirsuta*, *Bacterium medicaginis* var. *phaseolicola* on, 16.

Puk seed disinfection apparatus, 519.

*Fullularia pullulans* in pharmaceutical preparations in Denmark, 115.

— in sooty moulds in New S. Wales, 59, 60.

(?) — on beans, peas, and *Phaseolus lunatus* in U.S.A., 2.

— on timber, control, 762.

— on wood pulp in Scandinavia, 545; in Sweden, 275.

—, toxicity of chemicals to, 115.

Pulpwood, see Timber.

*Punilus medullae* on vine, 679; in relation to court-noué, 8, 675.

Pumpkin, see Vegetable marrow.

*Punica granatum*, see Pomegranate.

‘Pupation’ disease of *Bromus*, oats, and other Gramineae in U.S.S.R., 493.

Purple blotch of onion in U.S.A., 222.

— spot of narcissus in England, 366.

*Pyracantha*, *Phytophthora omnivorum* on, in U.S.A., 562.

*Prausta nubilalis*, control of, by *Beanveria bassiana*, 444.

*Pyrenopeziza briardi* on raspberry in Holland, 12.

*Pyrenopeziza medicaginis* synonym of *Pseudopeziza jonesii*, 494.

*Pyrenophora* ascigerous stage of *Helminthosporium dictyoides*, *H. gramineum*, and *H. siccans*, 515; of *H. tritici-repentis*, 91.

—, *Cylindro-Helminthosporium* and *Drechslera* identical with, 125.

— *avenae* on oats in Scotland, 690; perithecial stage of *Helminthosporium avenae* (q.v.), 515, 690.

— *teres* on barley, control, 80, 159, 299; factors affecting, 159, 424; occurrence (?) in France, 424; in Germany, 159, 299; in India, 80; in Tunis, 429; varietal susceptibility to, 80.

— *trichostoma* ascigerous stage of *Helminthosporium gramineum*, 299.

*Pyroligneous acid*, use of, against damping-off of ornamental plants, 684.

*Pyrus*, *Bacillus amylovorus* can infect, 110.

—, *Gymnosporangium globosum* on, in U.S.A., 368.

—, *Ochropsora sorbi* on, in England and Wales, 492.

— *aucuparia*, *Fusarium lini* on, in Switzerland, 310.

— *baccata*, *Daldinia concentrica* on, in U.S.S.R., 494.

— *communis*, see Pear.

— *malus*, see Apple.

— *serotina*, *Corticium koleroga*, *C. sasakii*, and *C. stevensii* can infect, 796.

— *sinensis* var. *culta*, *Gymnosporangium haraeanum* on, in Japan, 533.

*Pythiaceous fungus* on beans, beets, cabbage, cucumber, and peas in Denmark, 559.

— on rice in Portugal, 119.

— on tulip and watercress in Denmark, 559.

*Pythiomorpha miyabeana* on rice in Japan, 119.

— *oryzae* on rice in Japan, 119; referred to *Phytophthora*, 119.

*Pythium*, antagonism of *Trichoderma* to, 53, 187.

— culture medium for, 194.

— on barley in Japan, 498.

(?) — on beet, control, 563, 588; effect of, on yield, 209; occurrence in Europe, 548; in Holland, 209; in U.S.A., (?) 563, 588.

(?) — on cabbage and chilli in U.S.A., 151, 563.

— on *Chrysanthemum* (?) *coccineum* in U.S.A., 222.

— on clover in U.S.A., 588.

— on cotton in the Sudan, 756.

— on cucumber, control, 151, 563; occurrence in U.S.A., 53, (?) 151, (?) 563.

(?) — on eggplant in U.S.A., 151.

— on flax in U.S.A., 588.

— on lucerne in U.S.A., (?) 241, 588.

— on *Melilotus alba* in U.S.A., 348, 588.

(?) — on peas and *Phaseolus lunatus* in U.S.A., 151.

— on pineapple in Hawaii, 455.

— on rice in Java, 119; in U.S.A., 221.

[*Pythium*] on spinach in U.S.A., (?) 151, (?) 563, 673.

(?) — on sweet peas in U.S.A., 151.

— on tea in Mauritius, 84.

— on tobacco in Java and Sumatra, 743.

(?) — on tomato in U.S.A., 151, 563.

— on wheat in Canada, 748; in Japan, 498.

— *aphanidermatum* can infect *Benincasa cerifera*, *Brassica chinensis*, cabbage, chilli, cucumber, *Cucurbita moschata*, eggplant, *Lagenaria vulgaris*, *Luffa cylindrica*, melon, *Momordica balsamina*, radish, tobacco, tomato, and watermelon, 7.

— on bean in Japan, 498.

— on cucumber in China, 6.

— on tobacco in Java, 153, 743; in Sumatra, 473.

— on tomato in Malaya, 81.

— *arrhenomanes* on cereals in Canada, 95.

— on grasses in Canada, 494.

— on maize in U.S.A., 95.

— on pineapple in Hawaii, 95, 455; *Nematosporangium arrhenomanes* and other species referred to, 95.

— on sugar-cane in Hawaii, 94; in Mauritius, 95; in U.S.A., 94.

— on wheat in Canada, 494.

(?) — *artotrogus* on radish in Sweden, 340.

(?) — *butleri* on ginger in Ceylon, 146.

(?) — on turmeric in Ceylon, 146.

— *de Baryanum*, antagonism of *Trichoderma* (?) *lignorum* to, 463.

— on beet, control, 209, 548, 809; factors affecting, 73; occurrence in Czecho-Slovakia, 73; in Europe, 548; in Holland, 209; in Irish Free State, 809.

— on grasses in Holland, 259.

— on iris in Sweden, 699.

— on *Nymphaea alba* in Sweden, 699.

(?) — on orange in Italy, 680.

— on pansy in Germany, 38.

— on *Sparganium simplex* in Sweden, 699.

— on spruce in Switzerland, 482, 728.

— on tomato in U.S.A., 146.

— on turf in Holland, 240.

—, taxonomy of, 259.

— *deliense* on tobacco in Sumatra, 473.

— *graminicolum* on sugar-cane in Hawaii, 530.

— *irregulare* and *P. mamillatum* on turf in Holland, 240.

— *megalanthum* on flax in U.S.A., 362.

— on melon in France, 77.

— on orangé (?) in Italy, 680.

— *myriotylum* on tobacco in Sumatra, 473.

— *piperinum* on *Piper betle* in India, 718.

— *sclerotiechum* on sweet potato in U.S.A., 467.

— *torulosum* on turf in Holland, 240.

— *ultimum* can infect beet, carrot, and mangold, 606.

— in soil in U.S.A., 520.

— on *Antirrhinum majus* in U.S.A., 383.

— on beet in U.S.A., 383, 671.

[*Pythium ultimum*] on celery, chilli, and eggplant in U.S.A., 383.  
 — on potato in Canada, 605.  
 — on rhododendron and *salvia* in U.S.A., 383.  
 — on spinach in France, 424.  
 — on sweet potato in U.S.A., 467.  
 — on tomato and wallflower in U.S.A., 383.  
 —, taxonomy of, 259.  
 — *volutum* on turf in Holland, 240.

*Quince* (*Cydonia vulgaris*), *Bacillus amylovorus* on, in U.S.A., 370.  
 —, *Bacterium tumefaciens* on, in Hungary, 499.  
 —, bitter pit of, in Bulgaria, 640.  
 — chlorosis, see mosaic of.  
 —, *Ciboria aestivalis* on, in New S. Wales, 704.  
 — diseases in U.S.A., 450, 768.  
 —, *Glomerella cingulata* can infect, 40.  
 —, *Gymnosporangium globosum* on, in U.S.A., 368.  
 —, *Lambertella corni-maris* can infect, 451.  
 —, mosaic of, in Bulgaria, 316, 640.  
 —, *Physalospora (?) obtusa* on, in France, 371; in U.S.A., 371.

Quinhydrone and quinone, experimental control of grey speck of oats by, 393.

Quinosol, toxicity of, to *Aspergillus flavus*, *A. fumigatus*, *A. glaucus*, *A. niger*, and *Citromyces*, 115; to *Pseudomonas mors-prunorum*, 641; to *Pullularia pullulans*, 115.  
 —, use of, against *Oidium* on *Kalanchoë blossfeldiana*, 637; against *Uncinula necator* on vine, 9.

Raan of swedes, see Brown heart of.

Radish (*Raphanus sativus*), *Actinomyces* on, in Sweden, 340; can infect beet in Sweden, 340.  
 —, *Alternaria brassicae* (Berk.) Bolle on, in the Philippines, 140.  
 —, *Bacterium formosanum* can infect, 738.  
 —, *Corticium solani* on, in Sweden, 340.  
 —, *Peronospora parasitica* on, in Japan, 1.  
 —, *Phoma lingam* can infect, 547.  
 —, *Plasmodiophora brassicae* on, in U.S.A., 206.  
 —, *Pythium aphanidermatum* can infect, 7.  
 —, — (?) *artotrogus* on, in Sweden, 340.

*Ragwildiana manihotis* on cassava in the Ivory Coast, 396.

Ramie, see *Boehmeria nivea*.

*Ramularia* on ginseng in Canada, 394.  
 — *batacticola* on sweet potato in U.S.S.R., 652.  
 — *beticola* on beet in Europe, 548.  
 — *mors-panaci*, *R. panacis*, *R. robusta* on ginseng in Canada, 393.  
 — *vallisumbrosae* on narcissus in England, 366.

*Ranunculus*, tomato spotted wilt affecting, in Western Australia, 129.

*Ranunculus*, *Entyloma ranunculi* on, study on, 654.

Rape (*Brassica napus*), *Cystopus candidus* on, in Japan, 2.  
 —, *Peronospora parasitica* on, in Japan, 1.  
 —, *Phoma lingam* on, in New Zealand, 547.  
 —, *Plasmodiophora brassicae* on, in New Zealand, 278; in U.S.A., 151.  
 —, *Pseudomonas campestris* on, in Bulgaria, 1.  
 —, turnip mosaic can infect, 731.

Raphanit, use of, against reclamation disease of cereal and other crops, 575.

*Raphanus*, *Cystopus candidus* var. *macrospora* on, in Japan, 1.  
 — *sativus*, see Radish.

*Raphiolepis delacouri*, *Fabraea maculata* on, interception of, in U.S.A. from the Argentine, 816.

Raspberry (*Rubus*), *Bacterium rhizogenes* on, in U.S.A., 181.

—, — *tumefaciens* on, control, 219; occurrence in Belgium, 448; in U.S.A., 180, 219, 288, 289; studies on, 288, 289.  
 —, *Cercospora rubi* on, in U.S.A., 774.  
 —, *Colletotrichum* on, in U.S.A., 378.  
 —, *Coryneum ruborum* on, in France, 595.  
 —, *Cryptodiaporthe macounii* var. *rubi* on, in France, 595.  
 —, *Didymella applanata* on, breeding against, 775; control, 595; occurrence in France, 595; in Germany, 775; in U.S.A., 181; varietal susceptibility to, 775.  
 — diseases in Canada and U.S.A., 642.  
 —, *Elsinoe veneta* on, in U.S.A., 181, 219.  
 —, *Glomerella rubicola* on, in U.S.A., 378.  
 —, *Gymnoconia interstitialis* on, in U.S.A., 181, 642.  
 — leaf curl in U.S.A., 181, 642.  
 —, *Leptosphaeria coniothrichum* on, in U.S.A., 181.  
 — mosaic, breeding and certification against, 642; control, 218; occurrence in Canada, 642; in U.S.A., 181, 218, 642; types of, 181, 218; varietal resistance to, 219; virus of, affecting brambles in U.S.A., 218.  
 —, *Mycosphaerella dubia* on, in U.S.A., 775; perfect stage of *Cercospora rubi*, 775.  
 —, — *rubi* on, in U.S.A., 181, 685.  
 —, *Pyrenopeziza briardi* on, in Holland, 12.  
 —, *Sphaerotheca humuli* on, in U.S.A., 181.  
 — streak in U.S.A., 181, 642.  
 —, *Verticillium ovatum* on, in U.S.A., 181.

Reclamation disease of barley in Germany, 255.  
 — of beet in Holland, 209.  
 — of cereals, control, 160, 575; occurrence in Germany, 160, 256, 575.  
 — of clover, *Cynosurus cristatus*, lupin, and maize in Germany, 255.  
 — of oats, control, 160, 225; occurrence in Germany, 160, 255, 256; varietal resistance to, 255.  
 — of *Ornithopus sativus* in Germany, 255.

[Reclamation disease] of plants in Germany, 256, 575; copper deficiency in relation to, 209, 256.

— — of rye, swedes, turnips, and wheat in Germany, 255.

*Redaellia*, systematic position of, 170.

— *elegans*, characters of, 169.

Red currant, see *Currants*.

Red rot of cotton bolls in the Belgian Congo, 223.

— rust of tobacco in Tanganyika, 61.

— suture of peach in U.S.A., 219; transmission of, (?) by *Macropsis trimaculata*, 498.

Reddening of persimmon in Italy, 656.

Resin spray injury, 683.

—, use of, as an adhesive, 245, 597.

—-potato starch emulsion, use of, as adhesive, 489.

Resorcinol compounds, toxicity of, to *Candida tropicalis*, 584, 759; to dermatophytes, 105.

*Rhabdoctine pseudotsugae* on *Pseudotsuga taxifolia* in Holland, 483.

*Rhacodiella* on chestnut in Italy, 801.

*Rhamnus* eradication in U.S.S.R., 18.

—, *Puccinia lolii* on, in U.S.A., 435; in U.S.S.R., 292.

— rusts in U.S.S.R., 292.

— *cathartica* and *R. lanceolata*, *Puccinia lolii* on, in N. America, 149.

*Rheum*, see Rhubarb.

— *undulatum*, *Puccinia rhei-undulati* on, in Japan, 719; teleuto stage of *Uredo rhei-undulati*, 719.

*Rhinocladiella atrovirens* on wood pulp in Sweden, 275.

*Rhinosporidium seeberi* on man, 100, 631; in India, 446.

*Rhinotrichum* on banana and plantain in Sierra Leone, 428.

*Rhizidiocystis ananasi* on pineapple in Hawaii, 455.

*Rhizina undulata* on pine in U.S.A., 663.

*Rhizoctonia*, *Moniliopsis* referred to, 278.

— on *Agrostis* in U.S.A., 562.

— on beet, cabbage, and chilli in U.S.A., 563.

— on coffee, control, 152; occurrence in the Cameroons, 31; in Java and Sumatra, 152, 743; varietal susceptibility to, 152.

— on conifers in Canada, 409.

— on cucumber, antagonism of *Trichoderma* to, 53; occurrence in U.S.A., 53, 563.

— on flax in U.S.A., 362.

— on grasses in Holland, 12; in S. Africa, 426.

— on groundnut, 212.

— on pine in U.S.A., 410.

— on pineapple in Hawaii, 455.

— on spinach in U.S.A., 563.

— on strawberry in New S. Wales, 348; in U.S.A., 562, 682.

— on tomato in U.S.A., 563.

— on vetch in U.S.A., 219.

— *bataticola* strain A, see *R. lamellifera*.

— strain C, see *Macrophomina phaseoli*.

— *crocorum*, see *Helicobasidium purpureum*.

[*Rhizoctonia*] *lamellifera* on grapefruit, 233.

— — on rice in India, 80.

(?) — *microscleria* on *Apios tuberosa*, bean, fig, *Firmiana simplex*, *Phaseolus lunatus*, and *Xanthium canadense* in U.S.A., 416.

— *monteithianum* on turf in England and U.S.A., 449.

— *solani* as the imperfect stage of *Corticium vagum*, 482. (See also *Corticium solani*.)

— *sylvestris*, *Mycelium radicis nigrostri-gosum* previously attributed to, 187.

— *zeae* on maize in U.S.A., 232.

Rhizome rot of iris in England, 698.

*Rhizopelta dominica*, mycetomata of, in Egypt, 305.

Rhizopods, *Pedilospora dactylopaga* on, in U.S.A., 99.

*Rhizopus* in soil in Europe, 655.

— on maize in U.S.A., 232.

— on stored fruit and vegetables in U.S.A., 322.

— on sweet potato in U.S.A., 118.

— on vine in S. Africa, 213.

— *cohnii* on cattle in U.S.A., 511.

— *nigricans* in pharmaceutical preparations in Denmark, 115.

— — on avocado pear in U.S.A., 707.

— — on cotton in U.S.A., 629.

— — on fig in Japan, 498.

— — on groundnut in Rhodesia, 678.

— — on hay in U.S.A., 249.

— — on narcissus in England, 366.

— — on sweet potato in U.S.A., 528.

— —, toxicity of chemicals to, 115.

— —, viability of, 784.

— *speciosum* in butter in U.S.A., 237.

— *stolonifer* on tobacco in Rhodesia, 678.

— *tritici* on hay in U.S.A., 249.

— — on sweet potato in U.S.A., 528.

Rhizosphere, definition of, 247.

*Rhododendron*, *Chrysomyxa rhododendri* and *Diplodia rhododendri* on, in Germany, 174.

—, *Exobasidium vaccinii* on, in Germany, 174; in U.S.A., 65.

—, *Gloeosporium*, *Pestalozzia*, *Phacidium*, *Phoma*, and *Phyllosticta cunninghamii* on, in Germany, 173.

—, *Phytophthora cactorum* on, (?) in France, 314; in Germany, 173.

—, *Pleospora* on, in Germany, 173.

—, *Pythium ultimum* on, in U.S.A., 383.

— *albiflorum*, *Exobasidium burtii* on, in U.S.A., 65.

— *californicum*, *Cryptostictis mariae* and *Exobasidium vaccinii-uliginosi* on, in U.S.A., 66.

— *indicum*, flower spot of, in U.S.A., 365, 586.

Rhodotorulaceae, a family of the anascomycetous yeasts, 192.

Rhubarb (*Rheum*), *Corticium centrifugum* on, in Japan, 719.

—, *Phyllosticta* (?) *straminella* on, in U.S.A., 7.

—, *Puccinia rhei-undulati* on, in Japan, 719; teleuto stage of *Uredo rhei-undulati*, 719.

*Rhynchosporium secalis* on barley in the Argentine, 15; in Tunis, 429.

*Rhytisma vaccinii*, *Ophiostoma vaccinii* previously identified as, 135.

*Ribes*, *Cronartium ribicola* on, in Canada, 65, 135; in Germany, 666; in U.S.A., 410; role of, in spread of infection to pine, 66, 135; specific and varietal susceptibility to, 410, 666; study on, 66.

— eradication against *Cronartium ribicola* on pine, 220, 455, 540, 666.

—, see also Currants.

— *grossularia*, see Gooseberry.

Rice (*Oryza sativa*), *Acremoniella atra* and *Alternaria oryzae* on, in Japan, 653.

—, *Brachysporum* on, in Indo-China, 468.

—, *Cephalosporium* on, in India, 80.

—, *Corticium centrifugum* on, immunization against, 385.

—, *rolfsii* on, immunization against, 385. See also *Sclerotium rolfsii*.

—, — *sasakii* on, comparison of *C. koleroga*, *C. stevensii*, and, 795; occurrence in Japan, 120.

—, — *solani* on, in U.S.A., 221.

— diseases, control, in China, 119.

— dwarf in Japan, 468; overwintering of, (?) in *Astragalus sinicus*, 469; transmission of, by *Nephrotettix apicalis* var. *cincticeps*, 468.

—, *Epicoccum purpurascens* on, in Japan, 653.

—, *Fusarium* on, in U.S.A., 221.

—, — *avenaceum*, *F. lateritium*, and *F. merismoides* on, in Japan, 653.

—, — *moniliforme* var. *majus* on, in India, 80, 264.

—, *Entyloma oryzae* on, *Ectostroma oryzae* and *Sclerotium phyllachoroides* as synonyms of, 331, 498; occurrence in Japan, 331, 498; in the Philippines, 331; in U.S.A., 331.

—, *Gibberella fujikuroi* on, compared with *Fusarium moniliforme* var. *majus*, 254; control, 120; occurrence in Japan, 254, 653; (?) in the Philippines, 120; overwintering of, 653; study on, 120, 254; varietal resistance to, 120.

—, — *moniliformis* on, in British Guiana and India, 217.

—, — *saubinetii* on, in Japan, 653.

—, *Leptosphaeria salvinii* on, control, 468; *Helminthosporium sigmaeum* conidial stage of, 119; immunization against, 385; occurrence in Indo-China, 468; in U.S.A., 119; *Sclerotium oryzae* sclerotial stage of, 119.

—, *Ophiobolus Miyabeanus* on, control, 468; factors affecting, 653; histological study on, 529; occurrence in Indo-China, 468; in Japan, 529, 653; in U.S.A., 221; pseudomycelioses, 529.

—, *Phytophthora* on in Japan, 119.

—, *Piricularia oryzae* on, in the Argentine, 529; in Japan, 653.

—, Pythiaceous fungus on, in Portugal, 119.

—, *Pythiomorpha miyabeana* and *P. oryzae* on, in Japan, 119.

[Rice], *Pythium* on, in Java, 119; in U.S.A., 221.

—, *Rhizoctonia lamellifera* on, in India, 80.

— root rot in Java, 152, 743.

—, *Sclerotium fumigatum* on, in Japan, 652.

—, — *hydropophilum* on, in U.S.A., 222.

—, — *rolfsii* on, in the Philippines, 315; in U.S.A., 221. See also *Corticium rolfsii*.

— stunting in Burma, 286.

—, *Tilletia horrida* on, in U.S.A., 222.

—, *Trichoderma lignorum* on, in U.S.A., 331.

*Ricinus communis*, *Bacterium tumefaciens* can infect, 111, 647, 740.

—, — *Phytophthora parasitica* can infect, 123; occurrence on, in India, 123.

—, — var. *piperina* can infect, 717.

—, — (?) *Stilbum* on, in Tanganyika, 13.

Rind breakdown of orange in U.S.A., 578.

— spot of orange in U.S.A., 233.

Ring blotch of citrus, suggested virus nature of, 505; zonate chlorosis considered identical with, 505.

— mosaic of tomato in Canada, 261.

— spot of lilac in Bulgaria, 462.

— of potato in Australia, Brazil, England, Germany, Holland, Irish Free State, Japan, U.S.A., and U.S.S.R., 523; serological studies on, 385, 782; transmission of, to tobacco, 660.

— of tobacco, apparent recovery from, 402; occurrence in U.S.A., 245, 724; properties of virus of, 186, 401, 659, 782; relation of, to cucumber mosaic, 385; to potato virulent latent virus, 261; to tobacco mosaic, 385; serological studies on, 245, 385; transmission of, to *Zinnia elegans*, 812; varietal susceptibility to, 401, 660.

*Robillardia bataticola* on sweet potato in U.S.S.R., 652.

*Robinia pseud-acacia*, mottling of, in Bulgaria, 462.

—, moulds on, in U.S.A., 666.

—, witches' broom of, in Bulgaria, 462.

Root rot of flax in U.S.A., 363.

— of grapefruit in Trinidad, 627.

— of rice in Java, 152, 743.

— of sorghum in U.S.A., 95.

— of sugar-cane in Brazil, 719; in Queensland, 333; in Uganda, 793.

Rosaceae, *Bacillus amylovorus* on, in U.S.A., 702.

—, mosaic of, in Bulgaria, 316.

Rose (*Rosa*), *Bacterium tumefaciens* on, in England, 313.

—, *Botrytis cinerea* on, in England, 313, 363.

—, chlorosis of, in England, 313.

—, *Coniothyrium* on, in the Argentine, 15.

—, — *rosarum* on, in England, 313, 638.

—, *Coryneum microstictum* on, in U.S.A., 172..

—, crinkle in U.S.A., 363.

—, *Cryptosporium minimum* on, in Germany, 172; in U.S.A., 171.

—, *Diaporthe umbrina* on, in Japan, 498.

[Rose], *Diplocarpon rosae* on, in England, 313; in U.S.A., 382.  
 —, *Gnomonia rubi* on, in England, 313.  
 —, *Leptosphaeria coniothryium* on, in England, 313; in Japan, 498.  
 —, mosaic of, control, 316; effect of, on bloom production, 171; occurrence in Bulgaria, 316; in U.S.A., 171, 363, 498; transmission of, 363; to apple and pear, 316; varietal susceptibility to, 171.  
 —, *Peronospora sparsa* on, in England, 313.  
 —, *Phomopsis* on, 453.  
 —, *Phragmidium A* and *B* on, in England, 638.  
 —, — *mucronatum* on, in England, 313.  
 —, *Sphaeloma rosarum* on, in Rhodesia, 678.  
 —, *Sphaerotheca pannosa* on, control, 37, 313, 314, 382, 638, 644; nature of resistance to, 711; occurrence in England, 313, 638, 644; in Germany, 37, 313, 314; in U.S.A., 382.  
 —, *Stereum purpureum* on, in England, 313.  
 —, (?) *Stilbum* on, in Tanganyika, 13.  
 — streak disease in U.S.A., 363.  
 'Rose comb' of mushrooms in Great Britain, 346.  
*Rosellinia* on cacao in the British Empire, 87.  
 — on coffee in Venezuela, 397.  
 — on orange in St. Lucia, 84.  
 —  *aquila* on *Buxus sempervirens* in U.S.S.R., 62.  
 — *bunodes* on cacao in St. Lucia, 84.  
 — on *Hevea* rubber in Java, 152.  
 — *necatrix* can infect pear, 177.  
 — on apple in U.S.A., 176.  
 — on apricot in U.S.A., 177.  
 — on narcissus in England, 366.  
 — *pepo* on cacao in St. Lucia, 84.  
 Rosette of peach in U.S.A., 219, 374.  
 — of pecan in U.S.A., 538.  
 — of sweet potato in New S. Wales, 348.  
 Rossi-Cholodny technique for study of microbiological activity in soil, 469.  
 Rotterdam B disease of tobacco in Sumatra, 473.  
 'Rotzkrankheit' of onions in Germany, 553.  
 Rubber (*Hevea brasiliensis*), bark canker of, in Java, 743.  
 —, *Ceratostomella fimbriata* on, in Java, 743; in Malaya, 791.  
 —, *Corticium salmonicolor* on, in Borneo, 152; in Malaya, 791.  
 —, *Fomes lignosus* on, in Ceylon, 145; in Malaya, 790.  
 —, — *noxius* on, in Malaya, 790.  
 —, *Ganoderma pseudoferreum* on, in Malaya, 790.  
 —, *Oidium heveae* on, control, 331, 654, 657, 743, 791; factors affecting, 331, 791; occurrence in Ceylon, 654, 657; in Java, 152, 743; in Malaya, 331, 791.  
 —, *Phytophthora meadii* on, in India, 123.  
 —, — *palmivora* on, 47, 194; in Java, 743.  
 —, *Rosellinia bunodes* on, in Java, 152.  
*Rubus*, *Mycosphaerella dubia* on, in U.S.A., 775; perfect stage of *Cercosporarubi*, 775.  
 [*Rubus*] *canadensis*, *Gymnoconia interstitialis* on, in U.S.A., 643.  
 —, see also Blackberry, Dewberry, Raspberry.  
 — *idaeus*, see Raspberry.  
 — *loganobaccus*, see Loganberry.  
 — *occidentalis*, see Raspberry.  
 Rueping process of timber preservation, 205, 545.  
*Russula* on beech, birch, and larch, forming mycorrhiza, 463.  
 'Rust' of anemone in England, 676.  
 — of cotton in U.S.A., 629.  
 Rusts, method of determining losses caused by, 291.  
 — of France, 645; of Japan, 719; of Korea, 533; of Mississippi, 59; of Oregon, 745; of the Pacific North-west, 258; of Scotland, 193.  
 Rye (*Secale cereale*), (?) *Bacterium atrofaciens* on, in U.S.S.R., 297.  
 —, — *rathayi* on, in Germany, 766.  
 —, — *translucens* var. *undulosum* on, 571; (?) in U.S.S.R., 297.  
 —, — *Calonectria graminicola* on, control, 20, 21, 380; occurrence in Germany, 20; in Sweden, 21.  
 —, — var. *neglecta* on, in U.S.S.R., 297.  
 —, celery virus 1 can infect, 93, 615.  
 —, *Cercospora herpotrichoides* on, in U.S.A., 230.  
 —, *Claviceps purpurea* on, alkaloids of, 93, 362, 511, 696, 697; occurrence in Hungary, 93; in Rumania, 215; in Spain and U.S.S.R., 93.  
 —, *Dilophospora alopecuri* on, in Germany, 296.  
 — diseases in Kenya, 744.  
 —, *Erysiphe graminis* on, in Germany, 26, 689.  
 —, *Fusarium*, *F. culmorum*, *F. solani* var. *minus*, *Gibberella moniliformis*, and (?) *Micrococcus tritici* on, in U.S.S.R., 297.  
 — mosaic in U.S.S.R., 493.  
 —, *Ophiobolus graminis* can infect, 503; occurrence in Germany, 157.  
 —, *Puccinia agropyri* can infect, 501.  
 —, — *culmicola* on, in Japan, 796.  
 —, — *graminis* on, in Germany, 88; in U.S.S.R., 18.  
 —, — *secalina* on, factors affecting, 156, 689, 750; occurrence in Austria, 156; in Germany, 300, 689; in Kenya, 427; in Lithuania, 750; in U.S.S.R., 292; overwintering of, 750; physiologic forms of, 300; wheat varieties as differential hosts of, 300.  
 —, — *triticina* can infect, 292.  
 —, reclamation disease of, in Germany, 255.  
 —, *Tilletia caries* and *T. foetens* can infect, 626.  
 —, *Typhula graminum* on, in Belgium, 679; in Germany, 93.  
 —, *Urocystis occulta* on, in Sweden, 21; in U.S.A., 30.  
 —, *Wojnowicia graminis* on, in U.S.A., 569.

*Sabouraudites felineus*, synonymy of, 581.  
—, see also *Microsporon*.

*Saccharomyces*, serological reaction of, 34.  
—, toxicity of cresol and mercurochrome to, 758.  
— *cerevisiae*, differentiation of, from *Mycoctonuleae*, 582.  
— in Italian and other leavens, 383.  
—, longevity of, 648.  
—, tolerance of, for phenol, 306.  
— *gracilis caverniculae*, toxicity of dyes and metallic salts to, 584.  
— *minor* in Italian and other leavens, 383.

*Saccharum officinale*, see Sugar-cane.

*Safflower* (*Carthamus tinctorius*), *Puccinia verruca* and *Septoria carthami* on, in U.S.S.R., 493.

*Saffron* (*Crocus sativus*), *Fusarium bulbigenum* var. *blasticola* on, in Japan, 256.

St. John's disease of peas, 486, 613.

*Saissetia oleae*, *Cephalosporium lecanii* on, in the Argentine, 98.

Salicylic acid, toxicity of, to *Aspergillus niger* and *Botrytis allii*, 553; to *Candida tropicalis*, 584, 759; to *Colletotrichum circinans*, 553; to dermatophytes, 105; to *Gibberella saubinetii*, 553.  
— and its compounds, use of, against wheat bunt, 90, 228.

*Salix*, *Bacterium salicis* on, legislation against, in U.S.A., 400.

—, *Pestalozzia gongrogena* on, in Austria, 135.

—, *Physalospora miyabeana* on, in England, 479.

—, *Pseudomonas saliciperda* on, legislation against, in U.S.A., 400; occurrence (?) in U.S.A., 409.

—, *Venturia chlorospora* on, in England, 479.

*Salpighiosis*, tomato spotted wilt virus affecting, in England, 763.

Salt, see Sodium chloride.

— blight of sugar-cane in British Guiana, 217.

Saltation in *Aspergillus fuliginosus*, *A. japonicus*, *A. malvaceus*, and *A. wentii*, 334; in *Diaporthe perniciosa*, 249; in *Fusarium semitectum* and *F. solani*, 472; in *Helminthosporium M. H. sativum*, and *H. tetramera*, 622; in *Heterosporium gracile*, 448; in *Microsporon audouini*, 102; in *Puccinia graminis*, 155; in *P. lolii*, 149.

—, see also Variation.

*Salvia*, *Pythium ultimum* on, in U.S.A., 383.

—, tomato spotted wilt can infect, 404.

Sandalwood (*Santalum album*), spike disease of, biochemistry of, 477, 538; control, 477, 539; factors affecting, 477, 539; occurrence in India, 204, 265, 477, 538, 539, 802; studies on, 204, 265, 477, 538, 539; transmission of, 539; by grafting, 204, 265; by haustoria, 204; by insects, 265, (?) 539, 802; by seed, 265.

Sanoseed, use of, against *Actinomyces scabies* on potato, 118.

Sapolin paint as a wound dressing, 567.

Saponaphtha, use of, in a copper dust, 145.

*Saponaria officinalis*, *Macrosporium saponariae* on, in Estonia, 530.

*Satureia hortensis*, *Puccinia menthae* on, in Estonia, 530.

*Scabiosa*, tomato spotted wilt on, in Western Australia, 129.

— *succisa*, *Fusarium moniliforme* var. *anthophilum* on, in France, 699.

Scald of apple, control, 42, 772; differentiation of alcohol poisoning from, 770; factors affecting, 42; occurrence in England, 42; in U.S.A., 592, 770; study on, 42, 769; types of, 769.  
— of grapes in Italy, 422.

Scale insects, control of, by *Cephalosporium lecanii* in the Seychelles, 305.

—, fungi attacking, in the Argentine, 630.

—, *Stereocrea coccophila* on, in Ceylon, 443.  
—, see also Lecaniids.

— speck of narcissus in England, 366.

*Scedosporium apiospermum* on man in Canada, 760.

Sch. 1132, use of, against *Plasmopara viticola* on vine, 79.

*Schinus molle*, *Phymatotrichum omnivorum* on, in U.S.A., 562.

*Schistocerca paranensis*, see Locusts.

*Schizanthus*, tomato spotted wilt on, in England, 662.

*Schizoblastosporion*, a genus of the Tulasnoidae, 193.

*Schizophyllum commune* on apple in New S. Wales, 348.

— on timber in U.S.S.R., 270.

*Schizotorulopsis* not accepted as a genus, 193.

*Scleroconium venezuelanum* on *Xanthosoma sagittifolia* in Venezuela, 470.

*Sclerospora graminicola* on grass in Holland, 12.  
— on *Setaria italica* in Japan, 576, 577.

— *sacchari* on sugar-cane in Australia, 56; in Queensland, 333.

— *sorghii* on *Panicum trypheron* in India, 80.

*Sclerotinia* on elm in U.S.A., 222.  
— on lucerne, *Mellilotus alba*, and *M. officinalis* in Canada, 175.

— *aestivalis* renamed *Ciboria aestivalis*, 704.

— *americana*, toxicity of various elements to, 244.

— *betulae* on birch in U.S.A., 663.

— *cinerea* in the air of orchards in Bulgaria, 50.

— on fruit, legislation against, in England, 336.

— *fructicola*, absorption of copper by, from Bordeaux deposits, 381.

—, antagonism of bacteria and moulds to, 387.

—, *Ciboria aestivalis* (?) parasitizing, 704.

—, comparative study of *S. fructigena*, *S. laxa*, and, 703.

[*Sclerotinia fructicola*] on apricot in Australia, 704.  
 — on cherry in Canada, 495; in S. Australia, 559.  
 — on fruit trees, 367; in Australia and U.S.A., 704.  
 — on peach in Australia, 43, 559; in Canada, 594.  
 — on stone fruits in Victoria, 43.  
*fructigena*, comparative study of *S. fructicola*, *S. laxa*, and, 703.  
 — on apple in Italy, 703; virulence of, 40.  
 — on fruit trees, legislation against, in England, 336; in Denmark, 703; in England, 367; in Holland, 703; in U.S.S.R., 703.  
 — on plum in England, 641; (?) in U.S.S.R., 704.  
*fuckeliana* on strawberry in U.S.S.R., legislation against, 595.  
 — *laxa*, comparative study of *S. fructigena*, *S. fructicola*, and, 703.  
 — *Monilia oregonensis* distinct from, 495.  
 (?) — on apple in U.S.A., 449.  
 — on apricot in Tasmania, 703.  
 — on cherry, control, 703, 705; notes on, 705; occurrence in Canada, 495; in Italy, 705; in Tasmania, 703.  
 — on fruit trees in England, 367, 704.  
 — on nectarine in Tasmania, 703.  
 — on peach, control, 594, 703; occurrence in Tasmania, 703; (?) in U.S.A., 449; relation of, to little leaf, 449.  
 — on plum, control, 593, 641, 703; notes on, 593; occurrence in England, 593, 641; in Tasmania, 703; (?) in U.S.A., 449; (?) in U.S.S.R., 704; relation of, to little leaf, 449.  
*sclerotiorum* can infect *Melilotus indica*, 639.  
 —, effect of, on H-ion concentration of medium, 327.  
 —, fruiting of, in Bermuda, 560.  
 — on apricot in Western Australia, 315.  
 (?) — on clover in U.S.A., 685.  
 — on *Hibiscus sabdariffa* in India, 106.  
 — on hops in England, 792.  
 — on lemon in Cyprus, 742.  
 — on *Melilotus alba* in U.S.A., 638.  
 — on potato in U.S.A., 563.  
 — on squash in U.S.A., 420.  
 — on strawberry in U.S.A., 776.  
 — on tobacco in India, 126.  
 — on vegetable marrow in U.S.A., 420.  
*trifoliorum* on clover, control, 39; host range of, 315; occurrence in England, 677; in Estonia, 241; in Germany, 39; in Sweden, 315; in U.S.A., 685; specific resistance to, 677.  
 — on *Geranium dissectum* and *Myosotis arvensis* in Sweden, 315.  
*Sclerotium* on *Ambrosia artemisiifolia*, cantaloupe, and *Panicum sanguinale* in U.S.A., 221.  
 — on pine in U.S.A., 410.  
 — on potato in U.S.A., 221.  
 [*Sclerotium*] on turf in Holland, 240.  
 — *cepivorum* on onion in Germany, 553.  
 — *coffeicola* on coffee in British Guiana, Surinam, and Trinidad, 184; *Typhula* in relation to, 185.  
 — on *Jasminum pubescens* in Sierra Leone, 428.  
 — *complanatum* on sunflower in Rumania, 215.  
 — *delphinii*, comparison of, with *S. rolfsii*, 147, 399.  
 — on *Delphinium*, iris, lily, and *Physostegia virginiana* in U.S.A., 147.  
 — *fumigatum* on *Panicum crus-galli* and rice in Japan, 652.  
 — *hydrophilum* on *Panicum colonum*, *P. crus-galli*, rice, and *Typha latifolia* in U.S.A., 222.  
 — *omnivorum* on groundnut in Rumania, 215.  
 — *oryzae* sclerotial stage of *Leptosphaeria* *salvinii* (q.v.), 119.  
 — *phyllachroides* synonym of, or mistaken for, *Entyloma oryzae*, 331, 498.  
 — *rhizodes* on grass in Germany, 766.  
 — on *Phalaris arundinacea* in Germany, 39.  
 — *rolfsii*, comparison of, with *S. delphinii*, 147, 399.  
 —, *Corticium* stage of, 125, 196, 387, 399; referred to *C. rolfsii*, 125, 196.  
 — on *Aeginetia indica* in the Philippines, 315.  
 — (?) — on beet in U.S.A., 488.  
 — on chilli in U.S.A., 344.  
 — on *Chrysanthemum cinerariifolium* in Java, 743.  
 — on cotton in the Belgian Congo, 223.  
 — on *Delphinium* in S. Africa, 426.  
 — on eggplant in the Philippines, 315.  
 — on groundnut, 212; in the Philippines, 315; in Uganda, 82.  
 — on *Helichrysum bracteatum* in the Philippines, 314.  
 — on onion in the Philippines, 315.  
 — on *Piper betle* in India, 122, 718.  
 — on potato in India, 560.  
 — on rice in the Philippines, 315; in U.S.A., 221.  
 — on wheat in the Philippines, 315.  
 —, strains of, 399.  
 —, see also *Corticium centrifugum*, *C. rolfsii*.  
*Scolecostrichum musae* on banana in Fiji, 45.  
*Scopelopodium vulgare*, *Corticium anceps* can infect, 797.  
*Scolytus affinis* transmitting *Ceratostomella ulmi* on elm, 537.  
 — *multistriatus* transmitting *Ceratostomella ulmi* on elm, 133, 264, 536, 665.  
 — *pygmaeus* transmitting *Ceratostomella ulmi* on elm, 536.  
 — *scolytus* transmitting *Ceratostomella ulmi* on elm, 336, 536, 665.  
 — *sulcifrons* transmitting *Ceratostomella ulmi* on elm, 133; 264, 537.  
 — *ventralis*, *Trichosporium symbioticum* associated with, in U.S.A., 666.  
*Scopularia penicillata* a stage of *Grosmania*, 703.

*Scopulariopsis albo-flavescens* on man in Austria, 37.  
 — *americana* synonym of *Coccidioides immitis*, 100.  
 — *atra* on man in Austria, 37.  
 — *blochi* on man in Hungary, 695.  
 — *brevicaulis* can infect tomato, 405.  
 — — on man in Hungary, 104, 695.  
 — — — production of trimethylarsine by, 783.  
 — *fusca* on man in Austria, 37.  
 — *nicotianae* on tobacco, 471.  
 — *oidiospora* and *S. sphaerospora* on man in Austria, 37.  
 'Scorch' of iris in England, 698.  
*Secale cereale*, see Rye.  
 Seed disinfectants, effect of, on metals and vice versa, 597.  
 — disinfectants, method of testing, 501.  
 — disinfection apparatus, 47, 501, 519.  
 — — as a private enterprise in Holland, 21.  
 — — — co-operative methods for, 156, 380.  
 — — — factors affecting efficiency of, 688.  
 — — — in Sweden, 687.  
 — — — of forest tree seeds, 65.  
 Selenium compounds, methylation of, by moulds, 783.  
 Semesan, use of, against damping-off of spinach, 673; against *Fusarium* on bean, 207; against *F. batatas* [*F. bulbigenum* var. *batatas*] on sweet potato, 150; against *F. culmorum* on barley, oats, and wheat, 688; against *F. hyperoxysporum* [*F. oxysporum* f. 2] on sweet potato, 150; against *Helminthosporium sativum* on barley, oats, and wheat, 688.  
 — bel, use of, against *Actinomyces scabies* on potato, 118; against *Fusarium batatas* [*F. bulbigenum* var. *batatas*] and *F. hyperoxysporum* [*F. oxysporum* f. 2] on sweet potato, 150.  
*Semiarundinaria*, see Bamboo.  
*Sempervivum tectorum*, *Bacterium tumefaciens* can infect, 448.  
*Senecio cruentus*, see Cineraria.  
*Sepedonium* on man in U.S.A., 235; *Posadasia pyriformis* referred to, 760.  
*Septobasidium albidum* on *Lepidosaphes beckii* in the Argentine, 630.  
 — *alni* on grapefruit and orange in Venezuela, 398.  
 — (?) *pseudopedicellatum* on grapefruit in Trinidad, 627.  
*Septoria* on cereals in U.S.S.R., 291.  
 (?) — on granadilla in Trinidad, 182.  
 — on various hosts in U.S.A., 745.  
 — *acicola* on pine in U.S.A., 266.  
 — *alni* on alder in Spain, 396.  
 — *apii* on celery in Norway, 258; in U.S.A., 563; synonym of *S. apicola*, 258.  
 — *apii-graveolentis* on celery in the Philippines, 343.  
 — *apicola* on *Apium goughense* in Gough Island (Antarctic), 258; *S. apii* synonym of, 258.  
 — *carthami* on safflower in U.S.S.R., 493.  
 — *citrin* on citrus, interception of, in U.S.A. from Australia, Egypt, France, Greece, Italy, and Spain, 816.  
 — [*Septoria*] *gladioli* on *Gladiolus* in Cyprus, 193.  
 — *lycopersici* on tomato in Jersey, 492.  
 — *nodorum* on wheat in Tanganyika, 678; in U.S.A., 348.  
 — *passerinii* on *Lolium italicum* in Spain, 396.  
 — *pistacina* on pistachio nut in Tunis, 429.  
 — *piricola*, see *Mycosphaerella sentina*.  
 — *pittospori* on *Pittosporum*, intercepted in U.S.A. from Scotland, 816.  
 — *populi* on poplar in the Argentine, 15.  
*Sequoia gigantea* and (?) *S. sempervirens*, *Bacterium tumefaciens* can infect, 566.  
 Serological studies on *Bacillus carotovorus* and *Bact. flaccumfaciens*, 430; on *B. proteus vulgaris* and *B. prodigiosus*, 713; on *Bact. lacrymans*, 418; on *Bact. malvacearum* and *Bact. mori*, 430; on *Bact. tabacum*, 418; on *Bact. tumefaciens*, 430; on *Candida*, 444; on *C. albicans*, *C. parapsilosis*, *C. vulgaris*, *Endomyces*, and *Monilia*, 34; on *Mycoderma*, 34; on *Pseudomonas syringae*, 418; on *Saccharomyces*, *Torula*, and *Willia*, 34; on plant viruses, 185, 197, 327, 385, 394, 402, 699, 713, 781, 782, 798.  
*Sesame (Sesamum orientale)*, *Fusarium vasinfectum* on, in Japan, 8.  
 —, *Macrophomina phaseoli* on, in Cyprus, 83.  
*Setaria glauca*, *Aplanobacter stewarti* can infect, 354.  
 — —, *Cercospora setariae* on, in U.S.A., 195.  
 — *italica*, *Bacterium setariae* on, in Japan, 355.  
 — —, *Ophiobolus graminis* can infect, 503.  
 — —, *Sclerospora graminicola* on, in Japan, 576, 577.  
 — —, *Ustilago crameri* on, in China, 691.  
 Sheep, *Actinomyces dermatonomus* on, in S. Africa, 236.  
 — (?) *Monilia* on, in Norway, 34.  
 Shirlan AG, composition of, and use of, against *Cladosporium fulvum* on tomato and powdery mildews, 9.  
 — HB, use of, against *Uncinula necator* on vine, 9.  
 — WS, use of, as a timber preservative, 762.  
*Shorea robusta*, *Fomes albomarginatus* on, in India, 193.  
 Silesia copper dust, 79.  
 Silicon dioxide, effect of, on resistance of cereals to *Erysiphe graminis*, 26.  
 Silver, fungicidal activity of, 244.  
 — nitrate, use of, against *Cercospora nicotianae* on tobacco, 425.  
*Sinoxylon ceratoniae*, mycetomata of, in Egypt, 305.  
*Sisal (Agave sisalana)*, phosphorus deficiency of, in the Belgian Congo, 237.  
 — stem rot in Tanganyika, 678.  
*Sisymbrium orientale*, *Phoma lingam* can infect, 547.

Skins, *Aspergillus flavus-oryzae* on tanned, 762.

Smoke injury, 417, 680; to *Microsphaera quercina* on oak, 406.

Snowberry (*Symporicarpos racemosus*), *Sphaeloma symporicarpi* on, in U.S.A., 382.

Soap, toxicity of, to *Botrytis allii*, 49.

—, use of, against *Oidium* on *Kalanchoë blossfeldiana*, 637; against *Plasmopara viticola* on vine, 10; in vegetable seed disinfection, 277; with copper sulphate, 183.

Sodium arsenite, use of, in eradication of spiked sandal, 477, 539.

— bicarbonate, injury caused by, to the strawberry, 376.

—, use of, against *Penicillium digitatum* on orange, 96; with copper sulphate, 674.

— borate, use of, against dry and heart rot of beet, 282.

— carbonate, use of, against blue staining of timber, 612; against manganese injury to plants, 404.

— chlorate, growth of mushrooms on plots treated with, 616.

—, use of, in eradicating spiked sandal, 539.

— chloride as the cause of salt blight of sugar-cane in British Guiana, 217.

—, effect of, on *Corticium sasakii* on rice, 120; on the strawberry, 376.

—, use of, against wood-pulp fungi, 275; as a timber preservative, 540; on wrappers against butter moulding, 633.

— 2-chloroorthophenylphenolate, use of, against dermatophytes on man, 632.

— fluoride, consumption of, in U.S.A., 707.

—, use of, as a timber preservative, 271; against *Polystictus versicolor* on timber, 413.

— hypochlorite, toxicity of, to *Candida tropicalis*, 584, 759.

— lauryl sulphate as a spreader, 598.

— metabisulphite, use of, against *Botrytis cinerea* on vine, 214.

— nitrate, effect of, on orange mottle leaf and mycorrhiza, 710.

— oleyl sulphate as a spreader, 598.

— orthodinitroresol, use of, against *Sclerotinia fructicola* on stone fruits, 43.

— polysulphide, use of, against *Phoma destructiva* on tomato, 475; against *Plasmopara viticola* on vine, 10.

— salicylate, toxicity of, to *Tilletia caries*, 90, 228.

— silicate, use of, in the preparation of mercury ammonium silicate dip, 173.

— sulphate, effect of, on the strawberry, 376.

— sulphite, use of, against *Botrytis cinerea* on vine, 213; against grey speck of oats, 393.

— tetrachlorophenolate, use of, against dermatophytes on man, 632.

— thiosulphate, toxicity of, to *Candida tropicalis*, 759.

Soft scald of apple, identical with low temperature breakdown, 770; occurrence in U.S.A., 41, 770.

Soggy breakdown of apple, see low temperature breakdown.

Soil disinfection against *Asterocystis radicans* on cucumber, 212; against *Fusarium* on China aster, 172; against *Phytophthora parasitica* on *Solanum capsicastrum*, 636; against *P. p. nicotianae* on tobacco, 533; against (?) *Pythium* on lucerne, 241; against *P. aphanidermatum* on cucumber, 7; against *P. de Baryanum* on tomato, 146; against *Synchytrium endobioticum* on potato, 465.

— fungi, cellulose decomposition by, 332; factors affecting, 121, 392; occurrence in Australia, 121; in Europe, 655; in Japan, 332; in Manitoba, 791; in Oklahoma, 120.

—, relation of, to humus types, 602; Rossi-Cholodny technique for study of, 469.

— 'sickness' of sugar-cane in Australia, 532.

— sterilization by electricity in U.S.A., 460, 519, 778.

— by steam against *Fusarium solani* on mushrooms, 346; against (?) *Pythium* on lucerne, 241; against *Thielaviopsis basicola* on tobacco, 403; methods of, in U.S.A., 460, 662.

*Soja*, see Soy-bean.

*Solanaceae*, woodiness of, in U.S.S.R., 131.

—, potato crinkle mosaic can infect, 681.

*Solanum aculeastrum* and *S. aculeatissimum*, tomato bunchy top can infect, 800.

— *capsicastrum*, *Botrytis* on, in Germany, 366.

—, *Phytophthora* (?) *parasitica* on, in England, 636.

— *demissum*, resistance of, to *Phytophthora infestans*, 390.

— *dulcamara*, *Synchytrium endobioticum* can infect, 788.

— *duplosinuatum* and *S. incanum*, tomato bunchy top can infect, 800.

— *melongena*, see Eggplant.

— *nigrum*, tomato bunchy top can infect, 800.

—, yellow cucumber mosaic can infect, 534.

—, *Synchytrium endobioticum* can infect, 788.

— var. *guineense*, cucumber mosaic affecting, in U.S.A., 473.

— *nodiflorum*, tobacco virus 6 can infect, 600.

— *panduraeforme*, tomato bunchy top can infect, 800.

— *sisymbifolium*, tobacco virus 1 can infect, 197.

— *sodomaicum*, tomato bunchy top can infect, 800.

— *taberosum*, see Potato.

*Solbar*, toxicity of, to *Botrytis allii*, 49.

—, use of, against *Sphaerotheca pannosa* on rose, 37.

Sooty mould of olive in Cyprus, 706.  
 — moulds, constituents of, in New S. Wales, 59.  
 — — on tobacco in French Indo-China, 126.  
*Sorbaronia*, *Gymnosporangium globosum* on, in U.S.A., 368.  
*Sorboporus*, *Gymnosporangium globosum* on, in U.S.A., 368.  
*Sorbus*, see *Pyrus*.  
 Sore shin of lupin in New Zealand, 109.  
*Sorghum* (*Sorghum vulgare*), *Aplanobacter stewarti* can infect, 354.  
 —, (?) *Bacterium holcicola* on, in U.S.A., 562.  
 — — *vascularum* can infect, 354.  
 — — celery virus 1 can infect, 93; occurrence on, in U.S.A., 615.  
 — — *Cercospora sorghi* and *Colletotrichum graminicolum* on, in Burma, 286.  
 — — diseases in Kenya, 744.  
 — — *Gibberella moniliformis* on, in India, 472.  
 — — *Helminthosporium leucostylum* and *H. nodulosum* can infect, 440.  
 — — *Macrophomina phaseoli* on, in India, 560.  
 — — mosaic in U.S.A., 258.  
 — — *Ophiobolus graminis* can infect, 503.  
 — — *Puccinia purpurea* on, in U.S.A., 258.  
 — — *Phyllosticta sorghina* on, 57.  
 — — root rot in U.S.A., 95.  
 — — *Sphacelotheca sorghi* on, in U.S.A., 439, 574.  
*Sorghum sudanense*, see Sudan grass.  
*Sorodiscus heterantherae* on *Heteranthera dubia* in N. America, 719.  
*Sorosporium reilianum*, hybridization between *Sphacelotheca sorghi* and, 504.  
 Sound waves, effect of, on tobacco mosaic virus, 199.  
 Soy-bean (*Glycine max*, *Soja*), *Bacterium sojae* on, in Brazil, 87; in Denmark, 78.  
 — — mosaic in Uganda, 82.  
 — — *Nematospora coryli* and *N. gossypii* on, in the Belgian Congo, 507.  
 — — *Phakopsora pachyrhizi* on, in Japan, 533.  
 — — cakes, *Aspergillus*, *A. amstelodami*, *A. herbariorum* var. *minor*, *A. repens*, *Monilia*, *Penicillium*, *P. waksmani*, and *Sphaerella* on, in Japan, 671.  
*Sparganium simplex*, *Pythium de Baryanum* on, in Sweden, 699.  
*Spartina*, *Fusarium heterosporum* and its var. *loli* on, in the Argentine, 720.  
 Speckle of banana in Queensland, 216.  
*Spermophthora*, relation of, to *Eremothecium* and *Nematospora*, 693.  
 — — *gossypii*, note on, 694.  
 — — on *Phaseolus lunatus* in the Belgian Congo, 507.  
*Sphaceloma* on *Canavalia ensiformis* and *Dolichos lablab* in Uganda, 82.  
 — — *fawcettii*, see *Sporotrichum citri*.  
 — — var. *viscosa* on orange intercepted in U.S.A. from Brazil, 816.  
 — — *perseae* on avocado pear in Brazil, Cuba, Porto Rico, (?) Rhodesia, and U.S.A., 459.  
 — — *rosarum* on rose in Rhodesia, 678.  
 [*Sphaceloma*] *symphoricarpi* on snowberry in U.S.A., 382.  
 — — *violae* on pansy and violet in New S. Wales and U.S.A., 764.  
*Sphacelotheca cruenta*, hybridization between *S. sorghi* and, 438.  
 — — *sorghi*, hybridization between *Sorosporium reilianum* and, 504; between *Sphacelotheca cruenta* and, 438.  
 — — on sorghum in U.S.A., 439, 574.  
 — — on Sudan grass in U.S.A., 439.  
 — — on various plants in China, 59.  
*Sphaeria trifolii*, renamed *Cymadothea trifolii*, 367.  
*Sphaerella* on soy-bean cakes in Japan, 671.  
 — — *tabifica*, see *Mycosphaerella tabifica*.  
*Sphaeropsis* on apple, 40.  
 — — on pine in U.S.A., 410.  
 — — *dalmatica* on olive in Cyprus, 706.  
 — — *ellisii* var. *chromogena* on pine and timber in Italy, 727.  
 — — *paeoniae* on peony in Italy, 107.  
*Sphaerostilbe coccophila* on *Chrysanthus aurantiifolius* in the Argentine, 98.  
 — — *repens* on *Aleurites montana* in Indo-China, 480.  
 — — on cacao in the British Empire, 87.  
*Sphaerotheca* on papaw in Queensland, 216.  
 — — *humuli* on raspberry in U.S.A., 181.  
 — — on strawberry in U.S.A., 376; in U.S.S.R., 493.  
 — — *pannosa* on rose, control, 37, 313, 314, 382, 638, 644; nature of resistance to, 711; occurrence in England, 313, 638, 644; in Germany, 37, 313, 314, in U.S.A., 382.  
*Spicaria divaricata* on hay in U.S.A., 249.  
 Spiders, *Blastotrichum aranearium* on, in Ceylon, 443.  
 Spike disease of sandalwood, biochemistry of, 477, 538; control, 477, 539; factors affecting, 477, 539; occurrence in India, 204, 265, 477, 538, 539, 802; studies on, 204, 265, 477, 538, 539; transmission of, 539; by grafting, 204, 265; by haustoria, 204; by insect vectors, 265, (?) 539, 802; by seed, 265.  
 — — of *Dodonaea viscosa* and *Stachyphila indica* in India, 539.  
 — — of *Vinca rosea* and *Zizyphus aenoplia* in India, 539, 801.  
 Spinach (*Spinacia oleracea*), *Aphanomyces* (?) *cladogamus* on, in U.S.A., 417.  
 — — celery virus 1 on, in U.S.A., 615.  
 — — yellows can infect, 313.  
 — — (?) *Corticium solani* on, in U.S.A., 151.  
 — — (?) crinkle of, in relation to beet 'crinkle', 548; transmitted by *Zosmanus quadratus*, 548.  
 — — cucumber yellow mosaic can infect, 5, 534.  
 — — damping-off of, in U.S.A., 673.  
 — — magnesium deficiency of, in U.S.A., 645.  
 — — mosaic in Germany, 671.  
 — — *Peronospora effusa* on, in U.S.A., 141, 417.  
 — — (?) *Pythium* on, control, 151, 563, 673;

occurrence in U.S.A., (?) 151, (?) 563, 673.

[Spinach (?) *Pythium*] *ultimum* on, in France, 424.

—, *Rhizoctonia* on, in U.S.A., 563.

—, tobacco virus 1 can infect, 211.

—, turnip mosaic can infect, 731.

Spindle sprout of potato in New Zealand, 715.

— tuber of potato in U.S.A., 784.

Split leaf of hops in England, 423.

*Spondylocladium* on sugar-cane in U.S.A., 57.

— *atrovirens* on potato in the Argentine, 223.

*Spongospora subterranea* can infect tomato, 525.

— on potato, legislation against, in Egypt, 544; in Sweden, 672; in U.S.S.R., 336; occurrence in Sweden, 672; in U.S.S.R., 330; zoospores of, 525.

*Sporondonema*, supersession of, by *Hemispora* not accepted, 583.

*Sporobolomyces*, systematic position of, 192, 655.

*Sporotrichum* on man in Costa Rica, 169.

—, toxicity of phenol derivatives to, 105.

—, use of, in control of wood-pulp fungi, 275.

— *beurmanni* on man (?) distinct from *S. schenckii*, 632; occurrence in Algeria, 168; in Brazil, 759; in Japan, 309; in U.S.A., 632; study on, 309.

— *biparasiticum* in water in Algeria, 168.

— *cactorum* on *Cereus peruvianus* in Italy, 765.

— *citri* on citron in Java, 742.

— on citrus in U.S.A., 578, 692.

— on grapefruit, control, 162, 627; occurrence in New S. Wales, 162; in Sierra Leone, 428; in Trinidad, 627; (?) in U.S.A., 348.

— on lemon, control, 162, 742; occurrence in Java, 742; in New S. Wales, 162; (?) in U.S.A., 348.

— on lime in U.S.A., 348.

— on orange, control, 84, 218, 742; occurrence in British Guiana, 218; in Java, 742; in Sierra Leone, 428; in St. Lucia, 84; (?) in U.S.A., 348; in Venezuela, 398.

—, see also *Sphaceloma fawcettii* var. *viscosa*.

— *columnare* on *Hirsutella* in the West Indies, 443.

— *councilmani* can infect tomato, 405.

— *globuliferum* can infect *Colias lesbia*, 98.

— on *Dirphia lauta* in the Argentine, 98.

— on locusts in the Argentine, 98; in S. Africa, 99.

— on *Oeceticus geyeri* and *Phesia nu* in the Argentine, 98.

— *gougeroti* can infect tomato, 405.

— *paranense* can infect *Colias lesbia*, 98.

— on *Dirphia lauta* in the Argentine, 98; — on locusts in the Argentine, 98; (?) in S. Africa, 99.

— on *Oeceticus geyeri* and *Phesia nu* in the Argentine, 98.

[*Sporotrichum*] *schenckii* on man, 36, 100; control, 632; (?) distinct from *S. beurmanni*, 632; occurrence in U.S.A., 36, 632.

— *traversianum* on *Neomamillaria gullowiana* in Italy, 765.

Spot necrosis of potato, relation of, to potato rugose mosaic, 130.

— of tobacco, varietal susceptibility to, 660.

Spotted wilt of tomato, control, 129, 201, 262, 610, 725, 763; factors affecting, 404; occurrence in Australia, 129; in the British Isles, 662; in Canada, 261, 610; in England, 261, 262, 725; in India, 81; in Jersey, 492; in U.S.A., 62, 404; study on, 129; transmission of, by *Frankliniella*, 404; by *F. insularis*, 610; by rubbing, 201; by *Thrips*, 201; by *T. tabaci*, 367, 404, 610, 725, 763; to *Amaryllis*, 404; to *Antirrhinum majus*, 212; to bean, 201, 212; to *Begonia*, *Browallia*, *Campanula*, cauliflower, celery, *Cheiranthus*, *Datura*, *Delphinium*, *Emilia*, *Gaillardia*, *Gloxinia*, *Godetia*, and *Layia*, 404; to lettuce, lupin, and nettles, 201; to *Nicotiana glauca*, 404; to *N. glutinosa*, 610; to *Papaver* and *Pentstemon*, 404; to *Petunia*, 610; to *Primula* and *Salvia*, 404; to tobacco, 404, 610; to *Verbena*, 404; varietal susceptibility to, 129; virus of, affecting *Anemone* and *Aquilegia vulgaris* in Australia, 129; aster (China) in Australia, 129; in U.S.A., 201; bean in England, 107; *Calceolaria* in U.S.A., 201; *Calendula* in England, 763; *C. officinalis* in Australia, 129; cauliflower in England, 763; chilli and cineraria in U.S.A., 201; chrysanthemum in England, 763; *Convolvulus arvensis* in England, 107; *Coreopsis drummondii* and *Cosmos* in Australia, 129; dahlia in Australia, 129; in U.S.A., 201; *Datura* in U.S.A., 201, 404; eggplant in U.S.A., 201; *Gloxinia speciosa* in England, 107; *Hippeastrum calceolaria*, 662; lettuce in U.S.A., 212; *Matthiola* in England, 763; *Papaver nudicaule* in Australia, 129; *Petunia* in Australia, 129; in U.S.A., 201; *Ranunculus* in Australia, 129; *Salpiglossis* in England, 763; *Scabiosa* in Australia, 129; *Schizanthus* in England, 662; tobacco in Australia, 129; *Tropaeolum majus* in Australia, 129; in U.S.A., 201; *Zantedeschia aethiopica*, 201, 212, 367, 662, 725; *Zinnia* in England, 763.

Spotting of bean in U.S.A., 810.

— of peas in Mexico and U.S.A., 341.

Spraying of potato in England and Europe, 117; synonym of concentric necrosis, 253.

Spray calendars for apple, peach, pear, and vine in U.S.A., 175.

— injury, 151, 200, 382, 383, 497, 559, 562, 683.

Spraying apparatus, 48, 114, 369, 517, 519, 599, 675, 708, 778.

— effect of fungicides on metals of, and vice versa, 597.

[Spraying apparatus], principles governing efficiency of, 556.  
 — pressure, regulation of, 708.  
 Sprays, method of estimating wettability of, 556.  
 Spruce (*Picea*), *Ceratostomella piceae* on, *Cladosporium* stage of, 804; occurrence in Japan, 804; in U.S.S.R., 68.  
 —, — *pini* and *Cladosporium herbarum* on, in U.S.S.R., 68.  
 —, *Coniophora* (?) *fusispora* on, in Sweden, 803.  
 —, *Corticium leve* on, in U.S.S.R., 68.  
 —, — *vagum* on, in Switzerland, 482, 728.  
 —, *Endoconidiophora coerulescens* and *Epicoccum purpurascens*, in U.S.S.R., 68.  
 —, *Fomes annosus* on, in Great Britain, 804.  
 —, *Fusarium* on, in Switzerland, 728; in U.S.S.R., 68.  
 —, — *bulbigenum* var. *blasticola* and *Gibberella moniliformis* on, in Switzerland, 482, 728.  
 —, *Hormonema dematioides* and *Macrophoma* on, in U.S.S.R., 68.  
 —, *Mycelium radicum nigrostrigosum* on, forming mycorrhiza, in Sweden, 187.  
 —, *Peridermium coloradense* on, in U.S.A., 794.  
 —, *Polyporus borealis*, *P. schweinitzii*, and *Poria vaporaria* on, in Sweden, 803.  
 —, *Pythium de Baryanum* on, in Switzerland, 482, 728.  
 —, *Stereum sanguinolentum* on, in U.S.A., 728.  
 —, *Trametes pini* on, in U.S.A., 67; in U.S.S.R., 662.  
 —, — *serialis* on, effect of, on wood strength, 805.  
 —, 'wet wood' of, in Finland, Norway, and Sweden, 803.  
 Squash (*Cucurbita*), *Bacillus tracheiphilus* on, in U.S.A., 684.  
 —, celery virus 1 on, in Cuba, 93; in U.S.A., 553, 615; transmission of, by *Aphis gossypii*, 554.  
 —, *Choanephoroidea cucurbitae* on, in Japan, 498.  
 —, curly top of, in U.S.A., 339.  
 —, melon mosaic can infect, 6.  
 —, *Sclerotinia sclerotiorum* on, in U.S.A., 420.  
 —, storage decay in U.S.A., 684.  
 —, see also Vegetable marrow.  
*Stachybotrys* on paper in France, 698.  
 — *lobulata*, cellulose decomposition by, 584.  
 —, *Stachylium theobromae* on banana, in Sierra Leone, 427.  
*Stachylina*, note on, 630.  
*Stachys affinis*, *Corticium solani* on, in France, 77.  
*Stachytarpheta indica*, spike-like disease of, in India, 539.  
*Stagonopsis phaseoli* synonym of *Ascochyta boltshauseri*, 614.  
*Stagonospora bataticola* on sweet potato in U.S.S.R., 652.  
 — *crini* synonym of *S. curtisii*, 448.  
 — *curtisii* can infect *Amaryllis belladonna*,

*Chlidanthus fragrans*, *Crinum powelli*, *Galanthus*, *Hymenocallis calathina*, *Leucocymum vernum*, *Lycoris squamigera*, *Pancratium maritimum*, *Sternbergia citrina*, and *Zephyranthes candida*, 448.  
 [*Stagonospora curtisii*] on *Narcissus* in England, 366.  
 — on *Narcissus* *× Hippeastrum vittatum* hybrids in U.S.A., 448.  
 —, synonymy of, 448.  
 — *hortensis* and *S. phaseoli* compared with *Ascochyta boltshauseri*, 614.  
*Stagonostroma pycnidial* stage of *Gibberella*, 194.  
 Stella dusting apparatus, 716.  
 Stem rot of *Sisal* in Tanganyika, 678.  
*Stemphylium* in butter, 761; in U.S.A., 237.  
 — in eggs in France, 237.  
 Stenosis of cotton in India, 507, (?) 561.  
*Stephanoderes hampei*, *Beauveria bassiana* on, in the Belgian Congo, 224.  
*Sterculia*, *Phymatotrichum omnivorum* on, in U.S.A., 562.  
*Stereocrea coccophila* on a scale insect in Ceylon, 443.  
*Stereum gausapatum* on oak in U.S.A., 663.  
 — *hirsutum* on timber in U.S.S.R., 270.  
 — *induratum*, physiological characters of, 806.  
 — *purpureum*, cellulose decomposition by, 339.  
 — on plum in England, 772.  
 — on rose in England, 313.  
 — *sanguinolentum* on *Abies grandis* in U.S.A., 728.  
 — on conifers in Great Britain, 803; in U.S.A., 663.  
 — on larch and pine in U.S.A., 728.  
 — on *Pseudotsuga taxifolia* in U.S.A., 728.  
 — on spruce in U.S.A., 728.  
 — on timber in U.S.S.R., 270.  
 Steriform, use of, against *Botrytis tulipae* on tulip, 586.  
*Sternbergia citrina*, *Stagonospora curtisii* can infect, 448.  
 Stigmatomycosis of cotton in the Belgian Congo, 507.  
 (?) *Stilbum* on *Bersama* in Tanganyika, 678.  
 (?) — on *Cassia floribunda* and camphor in Tanganyika, 13.  
 (?) — on coffee in Tanganyika, 13, 678.  
 (?) — on *Cyphomandra betacea* in Tanganyika, 13.  
 (?) — on eucalyptus in Tanganyika, 13, 678.  
 (?) — on *Grevillea robusta* in Tanganyika, 13, 678.  
 (?) — on loquat, *Ricinus communis*, and rose in Tanganyika, 13.  
 (?) — on tea in Tanganyika, 13, 678.  
 — *cinnabarinum* on fig in U.S.A., 459; *Megalonectria pseudotrichia* ascigerous stage of, 459.  
*Stipella*, note on, 630.  
 Stipple streak of potato in New Zealand, 715.

*Stizolobium deerigianum*, *Bacterium stizolobii* on, in Brazil, 87.

Storage problems of fruit and vegetables in U.S.A., 461.

Strawberry (*Fragaria vesca*), *Aspergillus* on, in U.S.A., 682.

- , black root injury of, in U.S.A., 180, 348.
- , boron deficiency of, 376.
- , *Byssochlamys fulva* on, in England, 775.
- , *Colletotrichum fragariae* on, in U.S.A., 563.
- , *Corticium solani* on, in Rhodesia, 427; (?) in U.S.A., 563.
- , crinkle in U.S.A., 288.
- , *Cylindrocarpus radicicola* on, in England, 180.
- , *Fusarium* on, in U.S.A., 682.
- , *orthoceras* and *Hainesia lythri* on, in England, 180.
- , *Leptosphaeria coniothyrium* on, in England, 180; (?) in Holland, 12.
- , *Macrophomina phaseoli* on, in U.S.A., 670.
- , *Mucor* on, in U.S.A., 682.
- , *Mycosphaerella fragariae* on, in U.S.S.R., legislation against, 595.
- , *Pachybasium candidum* on, in England, 180.
- , *Phytophthora* on, in Scotland, 180; in U.S.A., 682.
- , *Rhizoctonia* on, in New S. Wales, 348; in U.S.A., 562, 682.
- , *Sclerotinia fuckeliana* on, in U.S.S.R., legislation against, 595.
- , *sclerotiorum* on, in U.S.A., 776.
- , sodium injury to, 376.
- , *Sphaerotheca humuli* on, in U.S.A., 376; in U.S.S.R., 493.
- , yellow edge in England, 180, 595; (?) in New Zealand, 179; transmission of, by *Capitophorus fragariae*, 179, 596.
- , yellows in U.S.A., 288, 684.

Streak disease of maize in Kenya, 744; (?) in Rhodesia, 626; studies on, 146, 246; transmission of, by *Cicadulina mbila* and *C. zea*, 146.

- , — of potato, anatomical differentiation of, 116; control, 55; latency of, 55; occurrence in Belgium, 251, 649; in Cyprus, 83; in Germany, 650; in Holland, 54; in Ireland, 524, 604; in U.S.A., 496; in U.S.S.R., 116; purification of virus of, 649; relation of, to healthy potato virus, 385; to potato acropetal necrosis, 251; to potato interveinal mosaic, 604; to potato rugose mosaic, 116; studies on, 54, 251, 649; transmission of, by *Aphis abbreviata*, 496; by grafting and insects, 649; by *Myzus persicae*, 251; by rubbing, 251, 649; by wounding, 251; to *Datura stramonium* and tobacco, 251; types of, 251, 524, 604, 649; varietal susceptibility to, 55.
- , — of raspberry in U.S.A., 181, 642.
- , — of rose in U.S.A., 363.
- , — of sugar-cane in Réunion, 56.
- , — of tomato, mitogenetic action of, 133; occurrence in New S. Wales, 348; in U.S.S.R., 113.

[Streak disease of tomato] (die-back type) in U.S.A., 201; transmission of, to *Datura stramonium*, *Nicotiana glauca*, *N. glutinosa*, and tobacco, 201.

- , — (mixed virus), chemical separation of the viruses of, 404; control, 262; effect of, on yield, 661; occurrence in Canada, 261; in England, 261, 262; in U.S.A., 201, 404, 661; mixed inoculations of, with *Bacterium tumefaciens*, 384, 600; relation of, to potato virus X, 261, 262, 384, 404, 661; to tobacco mosaic, 201, 261, 384; to tobacco virus 1, 262, 404, 661; to tomato die-back streak, 201; to tomato streak virus 1, 261; transmission of, to tobacco, 384, 600.
- , — (single virus), see tomato streak virus 1.
- , — (stem necrosis) in Canada, 261; relation of, to tobacco virus 9, 261.
- , — (virus 1), action of methylene blue on, 186; can infect *Datura stramonium*, *Nicotiana glutinosa*, and tobacco, 261; occurrence of, in Canada and England, 261; relation of, to tomato streak (mixed virus), 261.

Stream double refraction in relation to tobacco mosaic virus, 201, 521.

*Streptococcus lacticus* in yoghurt in Java, 328.

*Strophanthus balansac*, *Leptomonas* in the latex of, in Indo-China, 709.

Stubble deterioration of sugar-cane in U.S.A., 469.

Stunting of rice in Burma, 286.

*Stylopagis* predaceous on amoebae in U.S.A., 508.

- *hadra* in soil and plant refuse in U.S.A., 508.
- — on nematodes in U.S.A., 508.
- *Stysanus* in butter, 761.
- *stemonites* on vine, a constituent of *Dematophora glomerata*, 196; occurrence in Italy, 196.

Sublimatoform, constituents of, and use of, against *Ustilago avenae* and *U. kolleri* on oats, 572.

Sudan grass (*Sorghum sudanense*), *Aplanobacter stewarti* can infect, 354.

- , —, *Phacelotheca sorghi* on, in U.S.A., 439.

Sugar beet, see Beet.

Sugar-cane (*Saccharum officinale*), *Alternaria* on, in U.S.A., 57.

- , *Bacillus pyocyanus* group on, in India, 395.
- , *Bacterium albilineans* on, control, 530, 531; factors affecting, 531; occurrence in Hawaii, 530, 531; in Java, 743; in Queensland, 333; transmission of, by cuttings and knives, 531; varietal susceptibility to, 333, 743.
- , — *vascularum* on, in Barbados, 531; in Queensland, 332.
- , (?) *Capnodium* on, in the Argentine, 531.

[Sugar-cane], *Ceratostomella paradoxo* on, in Natal, 470.  
 —, *Cercospora* on, in Uganda, 793.  
 —, — *kopkei* on, in Burma, 81; in Japan, 396; in Java, 153.  
 —, — *longipes* on, in Brazil, 87; in U.S.A., 257.  
 —, — *taiwanensis* on, in Japan, 396.  
 —, chlorotic streak of, see fourth disease of.  
 —, *Colletotrichum falcatum* on, in Japan, 657; in U.S.A., 257, 469, 564, 656, 718; study on, 656; varietal resistance to, 257, 469, 564, 656, 718.  
 —, *Corticium rolfssii* on, in India, 125; *Sclerotium rolfssii* a stage of, 125.  
 —, *Cytopspora sacchari* on, in U.S.A., 348.  
 —, diseases, legislation against, in Brazil, 544; in Queensland, 332; in U.S.A., 208.  
 —, dwarf disease of, in Queensland, 333.  
 —, Fiji disease of, in Queensland, 333; transmission of, by *Perkinsiella saccharicida*, 333.  
 —, fourth disease of, in Hawaii, 530; in Mauritius, 84; in Queensland, 332.  
 —, *Fumago sacchari* on, in the Argentine, 532.  
 —, *Fusarium* on, in U.S.A., 657.  
 —, *Gibberella moniliformis* on, factors affecting, 58; note on, 80; occurrence in India, 80; in Java, 58, 153, 743; in Mauritius, 84; study on, 58; varietal susceptibility to, 84.  
 —, *Helminthosporium* on, in Uganda, 793.  
 —, — *nodulosum* can infect, 440.  
 —, — *ocellum* on, breeding against, 57; factors affecting, 57, 564; occurrence in Japan, 396; in U.S.A., 57, 257, 564; referred to *H. stenospilum*, 531; relation of *Leptosphaeria sacchari* and *Phyllosticta sorghina* to, 57; study on, 57; varietal susceptibility to, 58, 257.  
 —, — *sacchari* on, in Hawaii, 530; (?) in India, 80.  
 —, — *stenospilum* on, control, 530; occurrence in Hawaii, 530; in Japan, 531; in U.S.A., 257; referred to *H. ocellum*, 531; varietal susceptibility to, 257.  
 —, *Leptosphaeria sacchari* on, in U.S.A., 57; in Venezuela, 397; *Phyllosticta* (?) *sacchari* a stage of, 57; secondary to *Helminthosporium ocellum*, 57.  
 —, *Ligniera vascularum* on, in Venezuela, 397.  
 —, *Macrophomina phaseoli* on, in India, 80.  
 —, (?) *Meliola* on, in the Argentine, 531.  
 —, mosaic, antigenic properties of virus of, 394; *Aphis mali* in relation to, 743; control, 530, 793; effect of, on yield, 191, 257, 394; legislation against, in Peru, 736; occurrence in the Argentine, 394; in Brazil, 718; in Dutch East Indies, 743; in Hawaii, 530; in India, 80; 257; in Java, 257; in Kenya, 427; in Peru, 736; in Porto Rico, 607; in Uganda, 793; in U.S.A., 123, 394; in Venezuela, 397; studies on, 123, 191, 257; transmission of, 394; types of, 123, 394; varietal susceptibility to, 257, 397, 607, 718, 743, 793.  
 [Sugar-cane], *Nigrospora* on, in U.S.A., 57, 657.  
 —, Pahala blight of, in Hawaii, 531.  
 —, *Phyllosticta sorghina* on, in U.S.A., 57; *P. hawaiiensis*, *P. panici*, and *P. sacchari* synonyms of, 57.  
 —, *Phytonomas rubrilineans* on, in Queensland, 56; in Uganda, 793.  
 —, *Pleocya sacchari* on, in U.S.A., 656.  
 —, *Pleospora herbarum* on, action of, 124.  
 —, *Pythium arrhenomanes* on, in Hawaii, 94; in Mauritius, 95; in U.S.A., 94.  
 —, — *graminicolum* on, in Hawaii, 530.  
 —, root rot in Brazil, 719; in Queensland, 333; in Uganda, 793. (See also 'salt blight').  
 —, 'salt blight' of, in British Guiana, 217.  
 —, *Sclerospora sacchari* on, in Australia, 56; in Queensland, 333.  
 —, 'soil sickness' of, in Australia, 532.  
 —, *Spondylocladium* on, in U.S.A., 57.  
 —, streak disease of, in Réunion, 56.  
 —, stubble deterioration of, in U.S.A., 469.  
 —, top rot of, in Uganda, 793.  
 —, × sorghum hybrids, *Cercospora longipes*, *Colletotrichum falcatum*, *Helminthosporium ocellum*, and *H. stenospilum* on, in U.S.A., 258.  
 Sulfodust, use of, against *Coleosporium solidaginis* on China aster, 364.  
 Sulfospray, use of, against *Bacterium pruni* on peach, 682.  
 Sulfrox, use of, against *Venturia inaequalis* on apple, 591.  
 'Sulfurator' apparatus, 313.  
 Sulphostearite as a constituent of a copper dust, 145.  
 Sulphur, colloidal, see Colloidal sulphur.  
 —, cupric, see Cupric sulphur.  
 —, deficiency in relation to plant diseases, 469; to tobacco chlorosis, 610.  
 —, dioxide, use of, against *Fusarium solani* on mushrooms, 346; against grape wastage, 422, 491; against storage decay of squash, 684.  
 —, dust, consumption of, in U.S.A., 707.  
 —, —, tainting of tea by, 657.  
 —, use of, against cereal rusts in U.S.S.R., 18; against fruitlet black rot of pineapple, 182; against mildew in Germany, 380; against *Oidium* on *Piper betle*, 286; against *Oidium heveae* on *Hevea* rubber, 331, 654, 657, 791; against *Puccinia* spp. on wheat, 293; against *Pythium ultimum* on potato, 606; against *Ustilago hordei* on barley, 159; against *Venturia inaequalis* on apple, 496, 591, 769.  
 —, effect of soil applications of, on *Actinomyces scabies* on potato, 118, 381; on *Uromyces solanacearum* on potato, 563; on brown heart of turnip, 547; on heart and dry rot of beet, 73; on *Phytophthora omnivorum*, 381; on pineapple wilt in Queensland, 216; on *Synchytrium endobioticum* on potato, 465.

[Sulphur], flotation, use of, against *Bacterium pruni* on peach, 683; against *Cladosporium carpophilum* on peach, 683; against *Coleosporium solidaginis* on China aster, 364; against *Venturia inaequalis* on apple, 148, 150.

— fungicides, use of, against *Gymnosporangium juniperi-virginianae* on apple, 684; against *Peronospora viciae* on peas, 287; against *Sporotrichum citri* on citrus, 578.

—, hydrophilous precipitated, use of, against *Ustilago hordei* on barley, 572.

— injury, 563, 684.

—, inoculated, effect of soil applications of, on *Bacterium solanacearum* on potato, 85; on *Verticillium albo-atrum* on eggplant, 74.

— lime, dry mix, effect of, on photosynthesis of apple, 183.

—, —, —, use of, against *Venturia inaequalis* on apple, 496.

— pentoxide, smoke injury attributed to, 680.

—, production of, in Germany, 380.

— vaporization against *Cladosporium fulvum* on tomato, 662; against *Sphaerotheca pannosa* on rose, 313, 314.

—, wettable, use of, against *Venturia inaequalis* on apple, 591; with lime-sulphur, 693.

Sulphuric acid, use of, against *Bacterium malvacearum* on cotton, 32, 562; against *Cercosporalla herpotrichoides* on cereals, 26; against cotton diseases, apparatus for, 48; against *Gloeosporium ampelophagum* on vine, 814; against *Phytophthora infestans* on potato, 789; against rice stunting, 286; against wood-pulp fungi, 275; in dehulling barley in smut investigations, 158.

Sulsol, use of, against *Botrytis cinerea* on vine, 213; against *Ceratostomella fici* on fig, 560.

Sun blotch of avocado pear in U.S.A., 707.

— scorch of tea in Nyasaland, 561.

Sunflower (*Helianthus annuus*), *Bacterium helianthi* on, in Japan, 314.

—, — *tumefaciens* can infect, 17, 112.

—, — *Clasterosporium müllerii* on, in Brazil, 87.

—, — *Corticium solani* on, resistance to, 603.

—, — *Puccinia helianthi* on, factors affecting, 747.

—, — *Sclerotium complanatum* on, in Rumania, 215.

Swedes (*Brassica campestris*), *Actinomyces* on, in Sweden, 340.

—, — *Bacillus carotovorus* on, in Wales, 808.

—, — brown heart of, in Great Britain, 558, 669; in Ireland, 669.

—, — *Cercospora* on, in Wales, 808.

—, — *Erysiphe polygoni* on, in Wales, 808.

—, — manganese injury to, 404.

—, — mosaic in Germany, 731; transmission of, by *Lugus pratensis* and by juice, 732.

—, — 'mottled heart' of, see brown heart of.

[Swedes], *Phoma lingam* on, in Great Britain, 558, 807; in New Zealand, 547.

—, — *Plasmodiophora brassicae* on, in Jersey, 493; in U.S.A., 148; in Wales, 808; varietal susceptibility to, 148, 485.

—, — reclamatory disease of, in Germany, 255.

—, — *Typhula gyrans* on, in Scotland, 279.

—, —, see also Turnip.

Sweet clover, see *Melilotus*.

Sweet pea (*Lathyrus odoratus*), bacterium causing fasciation of, in U.S.A., 365.

—, —, broad bean mosaic can infect, 4.

—, —, (?) *Corticium solani* on, in U.S.A., 151.

—, —, pea mosaic can infect, 486.

—, —, (?) *Pythium* on, in U.S.A., 151.

Sweet potato (*Ipomoea batatas*), *Ascochyta batatae*, *A. bataticola*, and *Brachysporium batatas* on, in U.S.S.R., 652.

—, —, celery virus 1 on, in Cuba, 93, 615; in U.S.A., 615.

—, —, *Ceratostomella fimbriata* on, in U.S.A., 118, 253.

—, —, *Cercospora cordobensis* on, in Brazil, 87.

—, —, *Coniothyrium bataticola* on, in U.S.S.R., 651.

—, —, *Diplodia* on, in U.S.A., 564.

—, —, *tubericola* on, in U.S.A., 118, 528.

—, — diseases in U.S.S.R., 651.

—, —, *Fusarium* on, in Japan, 254; in U.S.A., 118.

—, —, *batatas* [*F. bulbigenum* var. *batatas*] on, in U.S.A., 150.

—, —, *hyperoxysporum* [*F. oxysporum* f. 2] on, in U.S.A., 150.

—, —, *oxysporum* on, in U.S.A., 118, 528.

—, —, *Helminthosporium bataticola* on, in U.S.S.R., 652.

—, —, *Leptosphaeria bataticola* and *Leptosphaerulina bataticola* on, in U.S.S.R., 651.

—, —, *Macrophomina phaseoli* on, in U.S.A., 528, 670.

—, —, *Monilochaetes infuscans* on, in Brazil, 87.

—, —, *Mycosphaerella ipomoeae* on, in U.S.S.R., 652; *M. bataticola* synonym of, 652.

—, —, *Phyllosticta batatas* on, in Brazil, 87.

—, —, *Phytophthora*, *Pythium sclerotichum*, and *P. ultimum* on, in U.S.A., 467.

—, —, *Ramularia bataticola* on, in U.S.S.R., 652.

—, —, *Rhizopus* on, in U.S.A., 118.

—, —, *nigricans* and *R. tritici* on, in U.S.A., 528.

—, —, *Robillardia bataticola* on, in U.S.S.R., 652.

—, — rosette in New S. Wales, 348.

—, —, *Stagonospora bataticola* on, in U.S.S.R., 652.

*Swietenia mahagoni* and *S. macrophylla*, *Fomes noxius* on, in Java, 153.

Sycamore, see *Acer pseudoplatanus*.

*Symporicarpos racemosus*, see Snowberry.

*Synchytrium endobioticum* can infect *Hyoscyamus niger*, *Solanum dulcamara*, *S. nigrum*, and tomato, 788.

— on potato, breeding against, 252, 463, 788; control, 465, 715; dissemination of, 787; factors affecting, 650; genetics of resistance to, 252, 389, 465, 8; incipient infections of, 55; legislation against, in Austria, 64; in Denmark, 544, 788; in Egypt, 544; in Germany, 400, 736, 815; in Norway, 64, 788; in Sweden, 672, 788; in U.S.S.R., 336; occurrence in Austria, 464; in Czecho-Slovakia, 650; in Denmark, 741, 788; in England, 55; in Finland, 788; in Germany, 78, 389, 463, 651, 715, 788, 815; not in Malta, 618; in Norway, 251; in Poland, 526; in Sweden, 672, 787; studies on, 251, 389, 465, 526, 788; varietal resistance to, 55, 78, 252, 400, 465, 526, 651, 788.

*Syringa vulgaris*, see Lilac.

*Tagetes erecta*, aster yellows affecting, in U.S.A., 171.

— *patula*, celery virus 1 can infect, 5.

Taka-diastase, production of, by *Aspergillus oryzae*, 603.

Talc-arsin dust, use of, against cereal smuts, 47; against wheat bunt, 22.

Tangerine, see Orange.

Tannins and their metallic salts, use of, as seed disinfectants, 114.

*Taphrina avrea* on poplar in Italy, 665.

— *cerasi* on cherry in Germany, legislation against, 736.

— *deformans* on peach, control, 315, 594; factors affecting, 594; occurrence in Canada, 44, 594; in France, 594; in Western Australia, 315; overwintering of, 44; study on, 374.

Tar distillate emulsion, use of, against *Ceratostomella fimbriata* on *Hevea* rubber, 791.

— oil, toxicity of, to *Pseudomonas mors-prunorum*, 641.

— use of, against *Puccinia menthae* on *Mentha villosa-nervata*, 792.

— soap, use of, as adhesive, 475.

—, see also Coal tar, Creosote.

*Taxus baccata*, see Yew.

Tea (*Camellia sinensis*), *Armillaria mellea* on, in Nyasaland, 14.

—, drought damage to, in Ceylon, 657.

—, *Glomerella cingulata* on, in India, 721.

—, — *major* on, *Colletotrichum conioides* stage of, 720; occurrence in India, 720.

—, *Macrophomina phaseoli* on, in Nyasaland, 561.

—, *Poria hypolateritia* on, in Ceylon, 657.

—, *Pythium* on, in Mauritius, 84.

—, (?) *Stilbum* on, in Tanganyika, 13, 678.

—, sun scorch of, in Nyasaland, 561.

—, tainting of, by sulphur dust, 657.

Teak (*Tectona grandis*), *Bacterium solanacearum* on, in Java, 153.

Technique for cultural studies of fungi, 327; for detecting fungus hyphae in Gramineae, 746; for filtration of viruses, 721; for inoculation with *Ustilago zae*, 750; for preservation of cultures, 461; for study of soil fungi, 392, 443, 469.

*Teichospora salicina* on trees and shrubs in New S. Wales, 59.

*Tenebrio molitor*, *Bacillus prodigiosus* and *Beauveria bassiana* on, antagonism between, 361.

*Tephrosia vogelii*, *Poria hypolateritia* on, 657.

Terbolan, use of, against *Phytophthora parasitica nicotianae* on tobacco, 533.

Termites, role of fungi in the diet of, in U.S.A., 166.

*Tetragonia expansa*, celery virus 1 on, in U.S.A., 615.

*Thalictrum*, *Puccinia triticina* can infect, 59, 292.

— *dasycarpum*, *T. dioicum*, *T. fendleri*, and *T. flavum*, *Puccinia rubigo-vera* and *P. tomipara* on, specialization in, 746.

— *glaucum*, *Puccinia persistens* on, 645.

—, — *rubigo-vera* on, specialization in, 746.

—, — *tomipara* can infect, 747.

—, — *triticina* on, 645.

— *minus*, *Puccinia persistens* on, 645.

—, — *rubigo-vera* on, specialization in, 746.

—, — *triticina* on, 645.

Thallium compounds, use of, as fungicides, 244.

*Thamnidium* in soil in Europe, 655.

*Thamnotettix geminatus* transmitting carrot yellows and celery yellows, 313.

— *montanus* transmitting aster yellows to celery, 313; celery yellows to aster, carrot, lettuce, mustard, *Plantago major*, and spinach, 313.

Thanalith, use of, as a timber preservative, 484.

*Thea*, see Tea.

*Thelocactus nidulans*, *Fusarium cactacearum* on, in Italy, 765.

*Theobroma cacao*, see Cacao.

Therapeutics, internal methods of, in plants, 479.

*Thielavia basicola* on flax in U.S.A., 362.

*Thielaviopsis basicola*, action of metals on, 647.

— on celery and lily in England and Wales, 492.

— on tobacco, breeding against, 147, 685; control, 403; effect of, on yield, 403; factors affecting, 403; occurrence in Canada, 403; in U.S.A., 147, 685; varietal resistance to, 147, 403, 685.

Thread blight, Marasmoid, see Marasmoid thread blight.

*Thrips* in relation to 'moucheture' of wheat in Algeria, 91.

— transmitting tomato spotted wilt, 201.

— *tabaci*, *Empusa* [*Entomophthora*] (?) *sphaerosperma* parasitizing, in U.S.A., 33.

— transmitting tomato spotted wilt, 404, 610, 725, 763; to *Emilia*, 404; to *Zantedeschia aethiopica*, 367.

*Thuja occidentalis*, *Didymascella thujina* on, in U.S.A., 794.

—, *Pestalozzia funerea* on, in Italy, 608.

— (?) — and *T. plicata*, *Poria subacida* on, in U.S.A., 805.

Thymol, toxicity of, to *Candida tropicalis*, 759; to dermatophytes, 105.

—, use of, against mildew on paint coatings, 520.

*Thyrospora sarcinaeforme* on clover in Spain, 396.

*Tilachlidium* in eggs in France, 237.

*Tilia*, see Lime tree.

Tillantin, Danish, see Ceresan U 564.

—, use of, against *Bacterium tumefaciens* on fruit trees, 499.

— R, use of, against *Urocystis tritici* on wheat, 89; against vegetable diseases, 277.

*Tilletia* on cereals in U.S.S.R., 18.

— *caries* can infect rye, 626.

— — on wheat, breeding against, 286, 681; control, 20, 21, 22, 48, 89, 90, 114, 228, 287, 380, 501, 572, 620, 745; cytology of, 433; effect of, on susceptibility to *Puccinia triticina*, 227; notes on, 502; factors affecting, 22, 681; genetics of resistance to, 286; heterothallism in, 432; hybridization of, with *T. foetens*, 433; new variety of, 350; occurrence in the Argentine, 626; in Australia, 88; in Austria, 501; in Canada, 495, 745; in China, 745; in Czecho-Slovakia, 90, 228; in France, 77; in Germany, 20, 380, 620; in Italy, 114; in Queensland, 572; in Rumania, 502; in Sweden, 21; in U.S.A., 89, 286, 350, 681; in U.S.S.R., 225; in Victoria, 22; physiologic forms of, 287, 626, 681; seedling lesions caused by, 88; strains of, 77; varietal resistance to, 225, 495.

— *foetens* can infect rye, 626.

— — on wheat, breeding against, 228, 681; control, 20, 21, 22, 89, 278, 380, 382, 501, 562, 572, 745; cytology of, 433; factors affecting, 22, 681; heterothallism in, 432; hybridization of, with *T. caries*, 433; notes on, 502; occurrence in the Argentine, 626; in Austria, 501; in Canada, 745; in China, 745; in Germany, 20, 380; in Queensland, 572; in Rumania, 502; in Sweden, 21; in U.S.A., 89, 227, 287, (?) 382, 562, 681; in U.S.S.R., 225; physiologic forms of, 227, 287, 626, 681; study on, 227; varietal resistance to, 225, 228.

— *horrida* on rice in U.S.A., 222.

— *indica* on wheat in India, 80.

*Tilletiopsis* a genus of Sporobolomycetes, 655.

Timber, *Alternaria* on, control, 762.

—, — *humicola* on, in U.S.S.R., 270.

—, *Armillaria mellea* on, in U.S.A., 266.

—, black knot of, in U.S.S.R., 269.

— blue stain in Finland, 729; in U.S.A., 612.

—, *Cadophora americana* on, in U.S.A., 274.

[Timber, *Cadophora* *brunnescens* on, in U.S.A., 729.

—, — *fastigiata* on, antagonism of *Mycotoruleae* to, 69; control, 140; occurrence in Norway, 140; in Scandinavia, 545; in Sweden, 69, 275.

—, — *lagerbergii*, *C. melinii*, and *C. obscura* on, in Sweden, 275.

—, — *repens* on, in U.S.A., 729.

—, — *richardiae* on, in Sweden and U.S.A., 275.

—, *Ceratostomella* on, in Norway, 140; (?) in Scandinavia, 545; in U.S.A., 612.

—, — *acoma* on, in U.S.S.R., 271, 273.

—, — *coerulea* on, *C. pilifera* regarded as co-specific with, 137; occurrence in Sweden, 274; in U.S.S.R., 270, 273; in Victoria, 137.

—, — *comata* on, in U.S.S.R., 271, 273.

—, — *imperfecta* on, *Haplographium* (?) *bicolor* conidial stage of, 272; occurrence in U.S.S.R., 270, 272, 273.

—, — *ips* on, *Graphium* stage of, 138; occurrence in U.S.A., 138, 729; transmission of, by *Ips grandicollis* and *I. pini*, 138.

—, — *multiannulata* and *C. obscura* on, in U.S.A., 729.

—, — *piceae* on, conidial forms and *Cladosporium* stage of, 804; occurrence in Japan, 804; in Sweden, 274; in U.S.S.R., 270, 273.

—, — *pilifera* on, in U.S.A., 729.

—, — *pini* on, in Japan, 275; in U.S.S.R., 270, 273.

—, — *pluriannulata* on, in U.S.A., 729.

—, — *stenoceras* on, in Sweden, 274.

—, — *Cladosporium elatum* on, in Sweden, 275.

—, — *herbarum* on, control, 762; occurrence in Sweden, 275; in U.S.S.R., 270.

—, *Coniophora puteana* on, action of, 69; control, 268, 541; factors affecting, 267, 269; occurrence in England, 136; in Germany, 69; in U.S.A., 541; in U.S.S.R., 270; specific resistance to, 268; studies on, 267, 268.

—, — *Corticium leve* on, in U.S.S.R., 270.

—, — *vagum* on, in U.S.A., 258.

— decay, chemical agencies in relation to, 139, 542, 543, 668; control, 806; occurrence in Australia, 806; in U.S.S.R., 337.

—, (?) *Diplodia* on, in Malaya, 540.

—, — *natalensis* on, in U.S.A., 729.

—, — *Endoconidiophora coeruleascens* on, in U.S.A., 729; in U.S.S.R., 270.

—, — *moniliformis* on, in U.S.A., 729.

—, — *Fistulina hepatica* on, 663.

—, — *Fomes cryptarum* on, in England, 136.

—, fungi destroying, in Estonia, 730; in Poland, 666; Russian text-book on, 542.

—, — *Fusarium* on, in U.S.S.R., 270.

—, — *Graphium rigidum* on, in U.S.A., 729.

—, — *Haplographium penicillioides* on, in Sweden, 275.

—, — *Hormonema dematioides* on, in U.S.S.R., 270; in Victoria, 137.

—, — *Hyalodendron lignicola* and its ff. *simplex* and *undulatum* on, in Sweden, 70.

—, — *Irpex* on, in Malaya, 540.

[Timber], *Lecythophora lignicola* on, antagonism of Mycotoruleae to, 69; occurrence in Norway, 140, 545; in Sweden, 69, 275.

—, *Lentinus lepideus* on, in England, 137.

—, *Lenzites sepiaria* on, in Canada, 484; in England, 137.

—, *Leptographium microsporum* on, in U.S.A., 729.

—, *Merulius lacrymans* on, action of, 68; control, 268, 542; factors affecting, 136, 267, 269; occurrence in England, 136; in Germany, 69, 542; in U.S.A., 137; in U.S.S.R., 267; specific resistance to, 136, 268; studies on, 136, 267, 268; viability of, 137, 267.

—, *Ostrea sylvester* on, 68.

—, *Oiodiodendron fuscum* and *O. griseum* on, in Sweden, 275.

—, *nigrum* on, in Sweden, 275.

—, (?) *Ophiostoma* on, in Scandinavia, 545. See also *Ceratostomella*.

—, *Panus stipticus* on, in U.S.S.R., 270.

—, *Penicillium* on, in U.S.S.R., 270.

—, — *expansum* and *P. puberulum* on, control, 762.

—, *Peniophora gigantea* on, in England, 137; in U.S.S.R., 270.

—, *Polystictus versicolor* on, in Great Britain, 413.

—, *Poria vaporaria* on, action of, 69; study on, 267.

— preservation by the Ascu process, 337; by the Bethell process, 205; by the Burnettizing process, 545; by the Card process, 545; by the 'Injecto'-kyanization process, 206; by the open tank method, 484; by the oxy-acetylene scouring and charring process, 806; by the Powellizing process, 138; by the Rueping process, 205, 545.

— in Australia, 138; in Germany, 206; in Great Britain, 413; in India, 138, 337; in Malaya, 484; in New Zealand, 762; in S. Africa, 138; in U.S.A., 205, 276, 545; in U.S.S.R., 270.

—, use of acid zinc fluoride for, 542; of brine for, 540; of carbolineum for, 138; of copper-arsenic for, 138; of creosote for, 70, 138, 806; of creosote oil for, 139; of creosote petroleum for, 667; of creosote-phosphatide for, 205; of fluralsil for, 542; of iron sulphate for, 271; of molasses for, 138; of nekal A.E.M. for, 730; of sodium fluoride for, 271; of 'Xylamon-Feuerschutz' for, 667; of zinc chloride for, 138, 667; of zinc fluosilicate for, 542; of zinc-metarsenite for, 667.

— preservatives, method of sampling timber for estimation of, 139, 276; of testing efficacy of, 3, 276, 337, 411.

—, *Pullularia pullulans* on, control, 762; occurrence in Scandinavia, 545; in Sweden, 275.

—, red stain of, in Canada, 484.

—, *Rhinocladiella atrovirens* on, in Sweden, 275.

—, *Schizophyllum commune* on, in U.S.S.R., 270.

[Timber], *Sphaeropsis ellisii* var. *chromo-gena* on, in Italy, 727.

—, *Stereum hirsutum* and *S. sanguinolentum* on, in U.S.S.R., 270.

—, *Trametes americana* on, in U.S.A., 795; previously referred to *T. odorata* or *T. protracta*, 795; formerly regarded as a form of *Lenzites sepiaria*, 795.

—, (?) *pini* on, in Canada, 484.

—, — *serialis* on, 805.

—, *Trichoderma lignorum* on, 166; in England, 137.

—, *Trichosporium heteromorphum* on, antagonism of Mycotoruleae to, 69; occurrence in Finland, 275; in Norway, 140, 275, 545; in Sweden, 69, 275.

—, — *tingens* on, in U.S.S.R., 273.

—, *Tuberculariella ips* on, in U.S.A., 138.

—, *Ustulina vulgaris* on, 667.

Tobacco (*Nicotiana*), *Alternaria* (?) *tabacinica* on, in Madagascar, 335.

—, — *tenuis* on, in U.S.A., 724.

—, *Aspergillus flavus* on, in Rhodesia, 678.

—, — *sulphureus* on, in Rhodesia, 678.

—, *aucuba* mosaic in U.S.A., 197, 260; properties of virus of, 260, 401; serological studies on, 197, 385; transmission of, to *Zinnia elegans*, 812; varietal susceptibility to, 401.

—, *Bacillus aroideae* on, in Sumatra, 473.

—, — *carotovorus* and *B. phyllophthorus* on, in Italy, 658.

—, *Bacterium angulatum* on, comparison of, with allied forms, 16; control, 200; factors affecting, 85, 403; occurrence in Rhodesia, 200; in U.S.A., 85, 335, 403, 724; transmission of, by *Protoparce sexta*, 335.

—, — *formosanum* can infect, 738.

—, — *maculicola* on, in Italy, 658.

—, — *melleum* on, in Italy, 659.

—, — *polycolor* on, 16.

—, — *pseudozooogloae* on, in Italy, 659; in Sumatra, 473.

—, — *solanacearum* on, control, 335, 658; factors affecting, 658; occurrence in French Indo-China, 126; in Italy, 659; (?) in Madagascar, 335; in Sumatra, 473, 678.

—, — *tabacum* on, breeding against, 61; control, 200, 222, 659; factors affecting, 85, 403; occurrence in Brazil, 87; in French Indo-China, 126; in Germany, 61, 659; in Italy, 659; in Rhodesia, 200; in Tanganyika, 60; in U.S.A., 85, 223, 403, 724; study on, 61; varietal susceptibility to, 61.

—, — *tumefaciens* can infect, 384.

—, beet mosaic can infect, 473.

—, boron deficiency of, in U.S.A., 609.

—, *Brassica* virus can infect, 669.

—, celery mosaic can infect, 5, 615, 660.

—, *Cercospora nicotiana* on, control, 200, 261, 425; occurrence in Australia, 425; in Ceylon, 261; in Rhodesia, 200, 678; in Sumatra, 473; in Tanganyika, 60.

—, chlorosis in Italy, 534; in U.S.A., 534, 610.

[Tobacco], *Cladosporium* on, in Madagascar, 335.

—, cucumber mosaic can infect, 401, 473, 534, 635, 660; occurrence in U.S.A., 685; transmission of, by *Macrosiphum gei*, *Myzus persicae*, and *M. pseudosolani*, 473; varietal resistance to, 401. (See also cucumber virus 1.)

—, cucumber virus 1 (Johnson's) can infect, 6.

—, — (Porter's) on, in U.S.A., 5; transmission of, to cowpea, 6; *Nicotiana glutinosa*, *N. langsdorffii*, spinach, and tomato, 5. (See also cucumber mosaic on.)

—, 'daon lidah' of, in Sumatra, 473.

—, diseases in U.S.A., 533.

—, *Erysiphe cichoracearum* on, control, 335; factors affecting, 533; occurrence in Java, 533; in Madagascar, 335; in Tanganyika, 60; varietal susceptibility to, 533.

—, etch in U.S.A., 401, 685.

—, female sterility virus identical with tomato woodiness, 131.

—, *Fusarium oxysporum* var. *nicotianae* on, in French Indo-China, 126; in U.S.A., 85.

—, 'gilah' of, in Sumatra, 473.

—, horse radish mosaic can infect, 731.

—, *Hyoscyamus* mosaic can infect, 185.

—, 'korab' of, in Sumatra, 473.

—, leaf curl, 335, 533, 678; control, 533, 678; leprosy disease ('tabao boka') identical with, 335; losses caused by, 678; occurrence (?) in the Belgian Congo, 679; in Madagascar, 335, 686; in Rhodesia, 678; in Tanganyika, 60; transmission of, by *Aleyrodidae*, 335, 533.

—, — spotting in Belgium, 259; in U.S.A., 724.

—, magnesium deficiency disease of, in U.S.A., 645.

—, manganese injury to, 404.

—, mosaic, artificial production of intracellular bodies of, 51; attenuation of virus of, 61, 197; concentration of the virus of, 115, 197, 781, 798; control, 335, 474, 658; cultivation of virus of, on tomato root tips, 127; cytology of, 799; differentiation of viruses of, 61, 326, 685; factors affecting, 198, 199, 401, 474; inheritance of ability to localize virus of, in chilli, eggplant, and *Nicotiana*, 126; masked strain of, 61; multiplication of virus of, in etiolated plants, 198; nature of virus of, 721; occurrence in Belgium, 260, 326; in French Indo-China, 126; in India, 198; in Madagascar, 335; in Queensland, 335; in Rhodesia, 474; in Sumatra, 473, 658; in Tanganyika, 60; in U.S.A., 61, 126, 127, 197, 198, 199, 245, 260, 724; overwintering of, 85, 685; particle size of three strains of virus of, 401; properties of virus of, 61, 197, 198, 199, 260, 401, 402, 403, 659, 722, 782; purification of virus of, 402, 609, 721; relation of, to tobacco leaf spotting, 260; to tobacco veinbanding, 677; to tomato severe etch, 782; to tomato streak, 201, 261; to various plant viruses, 385; serological studies on, 245, 385, 782, 798; size of particles of, 401; spread of virus of, in *N. sylvestris*, 198; strains of, 61, 246, 260, 401; stream double refraction in relation to, 201, 521; studies on, 61, 126, 127, 197, 198, 199, 245, 260, 400, 782, 798, 799; transmission of, 685; to bean, 199, 474, 659, 721, 722; to chilli, 198; to *N. glutinosa*, 127, 198, 199, 659, 721; to *N. langsdorffii*, 721; to *N. sylvestris*, 127, 198; to potato and tomato, 198; to *Zinnia elegans*, 812; types of, 61, 246, 260, 326, 385, 400, 474, 685; varietal resistance to, 401, 685. (See also Tobacco virus 1.)

[Tobacco] mottle virus, relation of, to 'healthy potato virus', 261.

—, necrosis in England and S. Australia, 798.

—, peony virus can infect, 199.

—, *Peronospora tabacina* on, control, 200, 216, 403; legislation against, in New S. Wales, 200; occurrence in New S. Wales, 200; in Queensland, 216; in U.S.A., 348, 403, 657, 723; overwintering of, 723; taxonomy of, 657.

—, *Petunia* mosaic can infect, 699.

—, physiological disorders of, 474.

—, *Phytophthora parasitica nicotianae* on, control, 533; factors affecting, 608; occurrence in French Indo-China, 126; in Java, 533, 743; in Sumatra, 473; in U.S.A., 608.

—, *Pleosporä alternariae* on, in U.S.A., 724.

—, potato crinkle can infect, 326.

—, — mosaic can infect, 681.

—, — mottle and potato ring spot can infect, 660.

—, — streak can infect, 251.

—, — virus D can infect, 329.

—, — X can infect, 185, 186, 262, 326, 388, 713.

—, — Y can infect, 186, 246.

—, 'pox' in Java, 533; transmission of, by *Myzus persicae*, 533.

—, (?) *Primula* virus can infect, 635.

—, *Pythium* on, in Java and Sumatra, 743.

—, — *aphanidermatum* can infect, 7.

—, — on, in Java, 153, 743; in Sumatra, 473.

—, — *deliense* and *P. myriotylum* on, in Sumatra, 473.

—, red rust of, in Tanganyika, 61.

—, *Rhizopus stolonifer* on, in Rhodesia, 678.

—, ring spot, apparent recovery from, 402; occurrence in U.S.A., 245, 724; properties of virus of, 186, 401, 659, 782; relation of, to cucumber mosaic, 385; to potato virulent latent virus, 261; to tobacco mosaic, 385; serological studies on, 245, 385; transmission of, to *Zinnia elegans*, 812; varietal susceptibility to, 401, 660.

—, Rotterdam B disease of, in Sumatra, 473.

[Tobacco], *Sclerotinia sclerotiorum* on, in India, 126.  
 —, *Scopulariopsis nicotianae* on, 471.  
 —, sooty moulds on, in French Indo-China, 126.  
 —, spot necrosis of, 660.  
 —, 'tabac boka' of, see leaf curl of.  
 —, *Thielaviopsis basicola* on, breeding against, 147, 685; control, 403; effect of, on yield, 403; factors affecting, 403; occurrence in Canada, 403; in U.S.A., 147, 685; varietal resistance to, 147, 403, 685.  
 —, tomato narrow leaf can infect, 263.  
 —, —— spotted wilt can infect, 404, 610; occurrence in Western Australia, 129.  
 —, —— streak (die-back type) can infect, 201.  
 —, —— (mixed virus) can infect, 661; combined effect of, with *Bacterium tumefaciens*, 384.  
 —, —— virus 1 can infect, 261.  
 —, —— 'woodiness' affecting, in U.S.S.R., 131; relation of, to tobacco female sterility virus and tobacco virescence, 131.  
 —, turnip mosaic can infect, 731.  
 —, veinbanding, cytology of, 246; occurrence in Rhodesia, 677; in U.S.A., 685, 723; relation of, to potato virus Y, 246; to tobacco mosaic, 677; spread from potatoes, (?) 677, 685, 723; varietal susceptibility to, 660.  
 —, *Verticillium albo-atrum* on, in U.S.A., 200.  
 —, virescence, identical with tomato woodiness, 131.  
 —, virus 1, action of methylene blue on, 186.  
 —, —— can infect bean, 474, 659, 722; *Capsicum minimum*, chilli, eggplant, 197; *Nicotiana glutinosa*, 474, 659; *Physalis peruviana*, *Solanum*, and *S. sisymbifolium*, 197; spinach, 211.  
 —, ——, effect of buffering on infectivity of, 722; of sulphates on, 404.  
 —, ——, hosts of, 661.  
 —, —— on chilli in U.S.S.R., 130.  
 —, —— on *Hyoscyamus niger* in U.S.S.R., 132.  
 —, —— on *Lycopersicum pimpinellifolium* in U.S.A., 473.  
 —, —— on tobacco, in England, 662; in U.S.A., 197; serological identification of, 197; transmission of, by *Macrosiphum gei*, *Myzus persicae*, and *M. pseudosolani*, 473; varietal susceptibility to, 660.  
 —, —— on tomato, effect of, on yield, 132, 661; occurrence in Canada, 261; in England, 261; in U.S.A., 473, 661; in U.S.S.R., 130, 131, 132; properties of virus of, 132, 661; relation of, to tomato fern-leaf, 130, 133; to tomato mosaic, 130, 261; to tomato streak, 261, 262, 661; transmission of, by *Aphis rumicis*, 132; by *Macrosiphum gei*, *Myzus persicae*, and *M. pseudosolani*, 473; by *Pergandeida*, 132.  
 —, —— 6, action of methylene blue on, 186.  
 —, —— can infect *Nicotiana glauca*, N.

*glutinosa*, 600; Solanaceae, 51; *Solanum nodiflorum*, tobacco, and zinnia, 600.  
 [Tobacco virus 6] on tobacco, factors affecting, 474, 659; varietal resistance to, 660.  
 —, —— on tomato, control, 262; cultivation of, on root tips, 127; immunization against, 600; intracellular bodies of, 51; occurrence in Canada, 261; in England, 261, 262, 535, 600; in U.S.A., 127; relation of, to tomato aucuba mosaic, 261; studies on, 127, 535, 600.  
 —, ——, purification of, 535.  
 —, ——, serological relationships of, 385.  
 —, —— 9 on tomato in Canada causing stem necrosis streak, 261.  
 —, —— 10 can infect cowpea, *Datura stramonium*, and tomato, 798.  
 —, —— on *Nicotiana glutinosa* in England, 798.  
 —, —— on tobacco in England and S. Australia, 798.  
 —, —— Valleeau's 10729, relation to, to cucumber mosaic virus and potato veinbanding virus, 782.  
 —, viruses, immunization against, 601.  
 —, yellow mosaic, see tobacco virus 6.  
 Tomato (*Lycopersicum esculentum*), *Acrostalagmus cinnabarinus* can infect, 405.  
 —, *Aliernaria solani* on, control, 382, 535, 563; occurrence in U.S.A., 382, 535, 563; overwintering of, 535.  
 —, apical rot, *Bacterium briosii* in relation to, 405; occurrence in Italy, 405.  
 —, *Aplanobacter michiganense* on, control, 535, 610, 682; factors affecting, 681; losses caused by, 681; occurrence in New S. Wales, 348, 610; in U.S.A., 151, 535, 681; study on, 681; varietal resistance to, 682.  
 —, aucuba mosaic of, see Tobacco virus 6 on.  
 —, *Bacillus proteus vulgaris* and *B. pyocyanus* can infect, 405.  
 —, *Bacterium formosanum* can infect, 738.  
 —, —— *solanacearum* on, bacteriophage of, 686; control, 337; factors affecting, 658; occurrence in Fiji, 337; in Sumatra, 658.  
 —, —— *tumefaciens* on, factors affecting, 17; gall formation by, 565; note on, 740.  
 —, —— *vesicatorium* on, legislation against, in Cuba, 400; occurrence (?) in Italy, 681.  
 —, *Beauveria bassiana* can infect, 405.  
 —, big bud identical with tomato woodiness, 131.  
 —, blossom-end rot of, in Australia, 520; in U.S.A., 800.  
 —, boron deficiency of, 475.  
 —, *Brachysporium tomato* on, in Japan, 344.  
 —, bunchy top, host range of, 799; occurrence in S. Africa, 799.  
 —, celery virus 1 can infect, 5; occurrence on, in Cuba, 93; in U.S.A., 615.  
 —, *Cephalosporium acremonium*, *C. cerebriforme*, and *C. gruetzii* can infect, 405.

[Tomato], chlorosis of, in U.S.S.R., 131.  
 —, *Cladosporium fulvum* on, breeding against, 78, 202, 684; control, 9, 78, 610, 662; genetics of resistance to, 202, 684; occurrence in England, 9, 662; in Germany, 78; in U.S.A., 202, 684; in Victoria, 610; physiology of, 475; studies on, 202, 475; *Trichothecium roseum* mistaken for, 475; varietal resistance to, 78, 202.  
 —, *Coccidioides immitis* can infect, 405.  
 —, *Corticium solani* on, in U.S.A., (?) 151, 263.  
 —, cucumber virus 1 (Porter's) can infect, 5.  
 —, — yellow mosaic can infect, 534.  
 —, curly top in U.S.A., 339; transmission of, by grafting, 202.  
 —, damping-off of, in U.S.A., 671.  
 —, *Debaryomyces fabryi* can infect, 405.  
 —, diseases, control, 277, 662; occurrence in Jersey, 492; in U.S.A., 662.  
 —, fern leaf, see under mosaic.  
 —, 'fruit woodiness' of, see 'woodiness' of.  
 —, *Fusarium bulbigenum* var. *lycopersici* on, metabolism of, 310; occurrence in Fiji, 337; in U.S.A., 151, 498; varietal resistance to, 498.  
 —, — *moronei* [*F. scirpi* var. *caudatum*] can infect, 405.  
 —, *Geotrichum candidum* var. *parasiticum* can infect, 405.  
 —, *Glomerella lycopersici* on, in Germany, 725.  
 —, *Hansenula anomala* can infect, 405.  
 —, 'healthy potato virus' affecting, in Canada, 261; in U.S.A., 661; relation of, to streak (mixed-virus), 201, 384, 661.  
 —, leaf roll in U.S.S.R., 335.  
 —, *Lichtheimia italicica* can infect, 405.  
 —, *Macrophomina phaseoli* on, in Cyprus, 83.  
 —, *Microsporon audouini* can infect, 405.  
 —, mosaic, control, 262; fern-leaf type of, 83, 108, 130, 218, 681; occurrence in British Guiana, 218; in Canada, 261; in Cyprus, 83; in England, 262; in Italy, 681; in U.S.A., 287; in U.S.S.R., 108; relation of, to tobacco virus 1, 130, 261; varietal susceptibility to, 218; virus of, (?) affecting *Arctium* in U.S.S.R., 108.  
 —, *Mueller racemosus* can infect, 405.  
 —, narrow leaf in New Zealand, 262; transmission of, by *Myzus pseudosolani*, 263; to tobacco, 263.  
 —, *Nematospora coryli* on, in U.S.A., 86.  
 —, — *gossypii* can infect, 86.  
 —, *Oidioopsis taurica* on, in Cyprus, 83.  
 —, (?) *Peronospora tabacina* on, in Australia, 724.  
 —, *Phoma destructiva* on, control, 263, 475; occurrence in Trinidad, 182; in U.S.A., 263, 475.  
 —, physiological disease of, in Jersey, 492.  
 —, *Phytophthora* on, in S. Africa, 426.  
 —, — *infestans* on, control, 218, 563; occurrence in Bermuda, 559; in Germany, 390; in U.S.A., 218, 405, 563; specialization in, 390.  
 [Tomato, *Phytophthora*] (?) *parasitica* can infect, 636; occurrence on, 194; in U.S.A., 263.  
 —, *Pleospora lycopersici* on, in U.S.A., 799; *Macrosporium sarcinaeforme* conidial stage of, 799.  
 —, potato calico disease can infect, 787.  
 —, — 'virulent latent' virus on, in Canada, 261; relation of, to 'healthy potato' virus, potato virus X, and tobacco ring spot, 261.  
 —, — virus D can infect, 329.  
 —, — X on, in Canada, 261; relation of, to streak (mixed virus), 261, 262.  
 —, psyllid yellows of, in Canada, 117.  
 —, (?) *Pythium* on, in U.S.A., 151, 563.  
 —, — *aphanidermatum* can infect, 7; occurrence on, in Malaya, 81.  
 —, — *de Baryanum* on, in U.S.A., 146.  
 —, — *ultimum* on, in U.S.A., 383.  
 —, *Rhizoctonia* on, in U.S.A., 563.  
 —, ring mosaic in Canada, 261.  
 —, rotting of stored, control, 322.  
 —, *Scopulariopsis brevicaulis* can infect, 405.  
 —, *Septoria lycopersici* on, in Jersey, 492.  
 —, severe etch, relationship of, to tobacco mosaic, 782.  
 —, *Spongospora subterranea* can infect, 525.  
 —, *Sporotrichum councilmani* and *S. gourteri* can infect, 405.  
 —, spotted wilt, control, 129, 201, 262, 610, 725, 763; factors affecting, 404; occurrence in Australia, 129; in British Isles, 662; in Canada, 261, 610; in England, 261, 262, 725; in India, 81; in Jersey, 492; in U.S.A., 62, 404; studies on, 129; transmission of, by *Frankliniella*, 404; by *F. insularis*, 610; by rubbing, 201; by *Thrips*, 201; by *T. tabaci*, 367, 404, 610, 725, 763; to *Amaryllis*, 404; to *Antirrhinum majus*, 212; to bean, 201, 212; to *Begonia*, *Browallia*, *Campanula*, cauliflower, celery, *Cheiranthus*, *Datura*, *Delphinium*, *Emilia*, *Gaillardia*, *Gloxinia*, *Godezia*, and *Layia*, 404; to lettuce, lupin, and nettles, 201; to *Nicotiana glauca*, 404; to *N. glutinosa*, 610; to *Papaver* and *Pentstemon*, 404; to *Petunia*, 610; to *Primula* and *Salvia*, 404; to tobacco, 404, 610; to *Verbena*, 404; varietal susceptibility to, 129; virus of, affecting *Anemone* and *Aquilegia vulgaris* in Australia, 129; aster (China) in Australia, 129; in U.S.A., 201; bean in England, 107; *Calceolaria* in U.S.A., 201; *Calendula* in England, 763; *C. officinalis* in Australia, 129; cauliflower in England, 763; chilli and cineraria in U.S.A., 201; chrysanthemum in England, 763; *Convolvulus arvensis* in England, 107; *Coreopsis drummondii* and *Cosmos* in Australia, 129; dahlia in Australia, 129; in U.S.A., 201; *Datura* in U.S.A., 201, 404; eggplant in U.S.A., 201; *Gloxinia speciosa* in England, 107; *Hippeastrum calceolaria*, 662; lettuce in U.S.A., 212; *Matthiola* in England,

763; *Papaver nudicaule* in Australia, 129; *Petunia* in Australia, 129; in U.S.A., 201; *Ranunculus* in Australia, 129; *Salpiglossis* in England, 763; *Scabiosa* in Australia, 129; *Schizanthus* in England, 662; tobacco in Australia, 129; *Tropaeolum majus* in Australia, 129; in U.S.A., 201; *Zantedeschia aethiopica*, 201, 212, 367, 662, 725; *Zinnia* in England, 763.

[Tomato], 'stolbur' of, see 'woodiness' of streak in New S. Wales, 348; in U.S.S.R., 133.

— (die-back type) in U.S.A., 201; transmission of, to *Datura stramonium*, *Nicotiana glauca*, *N. glutinosa*, and tobacco, 201.

— (mixed virus), chemical separation of the viruses of, 404; control, 262; effect of, on yield, 661; mixed inoculations of, with *Bacterium tumefaciens*, 384, 600; occurrence in Canada, 261; in England, 261, 262; in U.S.A., 201, 661; relation of, to 'healthy potato virus', 201, 384, 404, 661; to potato virus X, 261, 262; to tobacco mosaic, 201, 261, 384; to tobacco virus 1, 262, 404, 661; to tomato die-back streak, 201; to tomato streak virus 1, 261; transmission of, to tobacco, 384, 600.

— (single virus), see Tomato streak virus 1.

— (stem necrosis) in Canada, 261; relation of, to tobacco virus 9, 261.

— virus 1, action of methylene blue on, 186; can infect *Datura stramonium*, *Nicotiana glutinosa*, tobacco, 261; occurrence in Canada and England, 261; relation of, to tomato streak (mixed virus), 261.

—, *Synchytrium endobioticum* can infect, 788.

—, tobacco mosaic can infect, 198; cultivation of virus of, on, 127.

—, virus 1 on, effect of, on yield, 132, 661; occurrence in Canada and England, 261; in U.S.A., 473, 661; in U.S.S.R., 130, 131, 132; properties of virus of, 132, 661; relation of, to tomato fern-leaf, 130; to tomato mosaic, 130, 261; to tomato streak, 261, 262, 661; transmission of, by *Aphis rumicis*, 132; by *Macrosiphum ger*, *Myzus persicae*, and *M. pseudosolani*, 473; by *Pergandeida*, 132.

—, — 6 on, control, 262; cultivation of, 127; immunization against, 600; intracellular bodies of, 51; occurrence in Canada, 261; in England, 261, 262, 535, 600; in U.S.A., 127; relation of, to tomato aucuba mosaic (yellow mosaic), 261; studies on, 127, 535, 600.

—, — 9 on, in Canada, 261; relation of, to stem necrosis streak, 261.

—, — 10 can infect, 798.

—, *Torula sacchari*, *Trichophyton roseum*, and *Trichosporum asahii* can infect, 405.

—, *Verticillium albo-atrum* or *V. dahliae* on, in U.S.A., 283.

[Tomato], virus disease of, in England, 724.

—, 'woodiness' of, control, 132; effect of, on yield, 132; nature of virus of, 133; notes on, 132; occurrence in U.S.S.R., 128, 130, 131, 132, 133, 724; relation of, to tobacco female sterility virus, tobacco virescence, and tomato big bud, 131; studies on, 128, 130, 724; transmission of, (?) by *Agallia sinuata*, 130; virus of, affecting *Atropa belladonna* in U.S.S.R., 131; *Convolvulus arvensis* in U.S.S.R., 131, 724; *Datura*, Solanaceae, and tobacco in U.S.S.R., 131.

—, yellow mosaic of, see tobacco virus 6 on.

Tonka bean, see *Dipteryx odorata*.

Top necrosis of coffee in the Cameroons, 32.

— rot of sugar-cane in Uganda, 793.

*Torrubiella luteostrata* on *Trialeurodes vaporarium* in Belgium, 166.

Torula form of *Hendersonula toruloidea*, 83.

— on fruit trees in Canada, 44.

— on man in Colombia, 758.

—, serological reactions of, 34.

—, toxicity of, to chemicals to, 115, 758.

— *convoluta*, antagonism of, to *Phoma betae* on beet, 281.

— *heteroderae* on *Heterodera schachtii* in Czechoslovakia, 33; referred to *Trichosporum populneum*, 33.

— (?) *histolytica* on man in U.S.A., 444.

— (?) synonym of *Cryptococcus hominis*, 100; of *Torulopsis neoformans*, 694.

— *nasalis* synonym of *Torulopsis neoformans* var. *nasalis*, 694.

— *pullcherrima*, variation in, 523.

— *sacchari* can infect tomato, 405.

Torulopsidaceae a family of the anascomycetous yeasts, 192.

—, distinction of, from Mycotoruleae, 582.

—, toxicity of phenol to, 306.

*Torulopsis*, taxonomy of, 193, 582.

—, use of, in control of wood-pulp fungi, 275.

— *bergami* and *T. cabrini*, toxicity of chemicals to, 583.

— *hominis* and its var. *honduriana* synonyms of *T. neoformans*, 694.

— *neoformans*, *Blastomyces neoformans*, *Torula histolytica*, *T. nasalis*, *Torulopsis hominis*, and its var. *honduriana* synonyms of, 694; *Cryptococcus breweri*, *C. guilliermondii*, *C. kleini*, and *C. plimieri* (?) synonyms of, 758.

— vars. *nasalis* and *sheppei*, notes on, 694.

*Trabutia querina* on oak in Cyprus, 742.

*Trachysphaera fructigena* on cacao in the British Empire, 87.

— on coffee in the Ivory Coast, 153.

*Trametes*, key to species of, 795.

— *americana* on timber in U.S.A., 795.

— *odorata*, *T. americana* formerly referred to, 795.

— *lactinea*, secondary spore formation in, 611.

[*Trametes*] *pini* on forest trees in Poland, 663.  
 —— on pine in U.S.A., 67; in U.S.S.R., 662.  
 (?) —— on railway sleepers in Canada, 484.  
 —— on spruce in U.S.A., 67; in U.S.S.R., 662.  
 —— synonym of *Fomes pini*, 67.  
 —— *protracta*, *T. americana* formerly referred to, 795.  
 —— *serialis* on spruce, effect of, on wood, 805.  
 —— *subroseus* renamed *Fomes subroseus*, 795.  
*Trema guineensis*, *Armillaria* on, in Tanganyika, 678.  
*Trialeurodes vaporarium*, *Torrubiella luteostrator* on, in Belgium, 166.  
*Trichoderma*, antagonism of, to *Pythium*, 53, 187; to *Rhizoctonia*, 53; to soil fungi, 187.  
 ——, control of *Corticium solani* on citrus by, 188.  
 —— in soil in Manitoba, 791.  
 —— *koningi*, cellulose decomposition by, 332.  
 —— on beet in U.S.S.R., 551.  
 —— on lemon, 164.  
 —— *lignorum*, antagonism of, to *Armillaria mellea*, 249; to *Corticium solani*, 248, 463; to *Macrophomina phaseoli*, 249; to *Phymatotrichum omnivorum*, 739; to *Pythium de Baryanum*, 463; to soil fungi, 248.  
 ——, *Gonatorrhodiella parasitica* on, in U.S.A., 663.  
 —— on beet in U.S.S.R., 551.  
 —— on butter boxes, 761.  
 —— on citrus, 754.  
 —— on lemon in U.S.A., 163.  
 —— on orange in Rhodesia, 427; study on, 163.  
 —— on rice in U.S.A., 331.  
 —— on timber as a diet for termites, 166.  
 —— on wood pulp in England, 137.  
 —— *viride* on narcissus in England, 366.  
*Trichophyton*, characters of, 101.  
 —— on man, as a type of mycosis, 631; control, 758; occurrence in Hungary, 104.  
 —— *album*, virulence of, to cattle, 104.  
 —— *bulbosum* on the horse in Sudan, Syria, and Tunis, 103.  
 —— *cerebriforme*, differentiation of, by Wood's rays, 510.  
 —— *concentricum* on man, 308; in India and the Orient, 35.  
 —— *equinum* can infect man, 103.  
 —— on the horse in Germany, 103.  
 —— *faviforme discooides* on man in Spain, 102.  
 —— *gamelleirae* on cattle in Brazil, 759.  
 —— *glabrum* on man in Italy, 35.  
 —— *gypsum*, differentiation of, by Wood's rays, 510.  
 —— *granulosum*, see *T. mentagrophytes*.  
 —— *indicum* on man, 308.  
 —— *interdigitale* on man in Manchukuo, 35; in U.S.A., 632.  
 —— *mentagrophytes*, differentiation of, by Wood's rays, 510.  
 ——, *Epidermophyton* Kaufmann-Wolf a variant of, 759.  
 —— on man in U.S.A., 632.  
 ——, toxicity of dyes to, 105; of two wood preservatives to, 632.  
 ——, *T. niveum* synonym of, 101.  
 —— *papillosum* on cattle in Morocco and Syria, 104.  
 —— *persicorum* on man in Bulgaria, 35.  
 —— *purpureum*, toxicity of merthiolate to, 695.  
 —— *roseum* can infect tomato, 405.  
 —— *rubrum* on man in Jugo-Slavia, 632; in Manchukuo, 35.  
 ——, toxicity of aniline dyes to, 105; of merthiolate to, 695.  
 —— *sulphureum* on man in Morocco, 102.  
 —— *tonsurans* on man in Costa Rica, 169.  
 —— *tropicale*, see *T. concentricum*.  
 —— *violaceum* on man in Italy, 35; in Manchukuo, 35; in Morocco, 102.  
 —— *villosum* on cattle in French Indo-China, 104.  
*Trichosporon fuscum* on Italian and other leavens, 383.  
 —— *heteromorphum* on wood pulp, antagonism of Mycotoruleae to, 69; control, 140; occurrence in Finland, 275; in Norway, 140, 275, 545; in Sweden, 69, 275.  
 —— *pedrosoi* on man, 100; as a type of mycosis, 631; occurrence in Brazil, Paraguay, and Porto Rico, 509.  
 —— *populneum* on *Heterodera schachtii* in Czecho-Slovakia, 33; *Torula heterodera* synonym of, 33.  
 —— *symbioticum* on *Abies concolor* in association with *Scolytus ventralis* in U.S.A., 666.  
 —— *tingens* on timber in U.S.S.R., 273.  
*Trichosporum*, *Geotrichoides* referred to, 170.  
 —— *asahii* can infect tomato, 405.  
*Trichothecium* in the Arctic atmosphere, 461.  
 —— on chestnuts in Italy, 801.  
 —— *roseum*, antagonism of, to *Helminthosporium sativum*, 569.  
 ——, effect of radiations of metals on, 646.  
 —— in butter, 761.  
 —— mistaken for *Cladosporium fulvum*, 475.  
 —— on apple, virulence to, 40.  
 —— parasitizing *Dibotryon morbosum* on plum in Canada, 177.  
*Trifolium*, see Clover.  
*Trigonella foenum-graecum*, *Cercospora traversiana* on, in Burma, 286; in Estonia, 529.  
 ——, (?) *Oidiopsis taurica* on, in India, 561.  
*Trigonopsis*, a genus of the Torulopsoideae, 193.  
 Trimethylamine, presence of, in wheat bunt spores, 433.  
 Trimethylarsine, production of, by *Scopulariopsis brevicaulis*, 783.

*Trinema encelys*, *Pedilospora dactylopaga* on, in U.S.A., 99.

*Trioxo*, use of, against damping-off fungi, 563.

*Triposporium* as a constituent of sooty moulds in New S. Wales, 60.

*Triticum*, see Wheat.

— *timopheevi*, resistance of, to diseases, in U.S.S.R., 225.

*Tropaeolum majus*, tomato-spotted wilt on, in U.S.A., 201; in Western Australia, 129.

Truffles, see *Tuber*.

Trunk girdling of lime in U.S.A., 86.

*Tsuga*, *Mycelium radicis nigrostrigosum* on, forming mycorrhiza, in Sweden, 187.

— *brunonianae*, *Fomes pinicola* on, in India, 193.

Tuber blotch virus of potato in Irish Free State, 605; relation of, to interveinal mosaic, 605.

*Tuber*, artificial cultivation of, in France, 420.

— *magnatum* in symbiosis with poplar in Italy, 783.

*Tuberculariella ips* on timber in U.S.A., 138; transmission of, by *Ips grandicollis* and *I. pini*, 138.

*Tuberculina maxima* on *Cronartium cerebrum*, *C. coleosporioides*, and *C. pyri-forme* in U.S.A., 482.

— on *Cronartium ribicola* in U.S.A., 482, 727.

— on *Uredinopsis mirabilis* in U.S.A., 482.

*Tulip* (*Tulipa*), *Botrytis tulipae* on, in England, 366, 586.

—, breaking of, *Fusarium tubercularioides* [*F. avenaceum*], *Penicillium*, and *Phytophthora* on, in England, 366.

—, Pythiaceous fungus on and zonal rot of, in Denmark, 559.

Turf, brown patch of, in Holland, 240.

—, *Calonectria graminicola* on, in Great Britain, 588.

—, *Corticium fuciforme* on, control, 562, 587, 588; occurrence in Great Britain, 587, 588; in U.S.A., 562.

—, — *solani*, *Fusarium*, *Helminthosporium*, *Pythium de Baryanum*, *P. irregulare*, *P. mamillatum*, *P. torulosum*, and *P. volutum* on, in Holland, 240.

—, *Rhizoctonia monteithianum* on, in England and U.S.A., 449.

—, *Sclerotium* on, in Holland, 240.

Turmeric (*Curcuma longa*), *Pythium* (?) *butleri* on, in Ceylon, 146.

Turnip (*Brassica campestris*), actinomycosis of, in Sweden, 340.

—, *Alternaria brassicae* on, in the Philippines, 140; in U.S.A., 486.

—, *Bacterium formosanum* can infect, 738.

—, brown heart of, in Canada, 70, 547; in Europe and U.S.A., 70.

—, *Colletotrichum higginsianum* on, in U.S.A., 486.

—, *Corticium solani* can infect, 603.

—, *Cystopus candidus* on, in Japan, 2.

— diseases in Denmark, 741.

[Turnip], *Lambertella corni-maris* can infect, 451.

—, magnesium deficiency of, in U.S.A., 645.

— mosaic in U.S.A., 731; transmission of, by *Brevicoryne brassicae* and *Myzus persicae*, 731; to cabbage, *Lycopersicum pimpinellifolium*, mustard, rape, spinach, tobacco, and other crucifers, 731.

—, *Phoma lingam* on, in New Zealand, 546.

—, *Plasmodiophora brassicae* on, in U.S.A., 148, 206.

—, reclamation disease of, in Germany, 255.

—, *Typhula gyrans* on, in Scotland, 279.

Tutan, use of, against *Calonectria graminicola* and *Urocystis occulta* on rye, and *Ustilago avenae* on oats, 21; against vegetable diseases, 277; against wheat bunt, 21.

'Twist' of lily in Bermuda may be a form of mosaic, 559.

*Tympans pinastri* on pine in U.S.A., 612.

*Typha latifolia*, *Sclerotium hydrophilum* on, in U.S.A., 222.

*Typhella* on Chironomids, 630.

*Typhula*, *Sclerotium coffeicola* in relation to, 185.

— *betae* on beet in Europe, 548.

— *graminum* on cereals in Japan, 568.

— on rye in Belgium, 679; in Germany, 93.

— *gyrans* on swedes and turnips in Scotland, 279.

U. 520, use of, against wheat bunt, 21.

*Ulmus*, see Elm.

'Ultra-sulphur', use of, against *Helminthosporium gramineum* on barley, 21; against cotton and vine diseases, 47.

— violet rays, effect of, on *Fusarium eumartii*, 386, 521; on *Trametes pini*, 67; on wound cork formation of potato, 467. (See also Wood's rays.)

*Uncinula necator* on vine, breeding against, 285; control, 9, 75, 315; occurrence in England, 9; in Germany, 285; in Hungary, 741; in Italy, 75; in Malta, 618; in Western Australia, 315; perithecial production by, 741; varietal resistance to, 285.

'Uni-dea', use of, against wheat bunt, 114.

*Urania*, composition and use of, against *Venturia inaequalis* on apple, 700.

Urea as a stabilizer of colloidal sprays, 245.

Uredinales, see Rusts.

*Uredinopsis mirabilis*, *Tuberculina maxima* on, in U.S.A., (?) 482.

*Uredo coffeicola* on coffee in the Cameroons, renamed *Hemileia coffeicola*, 303.

— *gardeniae thunbergiae* renamed *Hemileia gardeniae thunbergiae*, 304.

— *rhei-undulati*, *Puccinia rhei-undulati* teleuto stage of, 719.

*Urocystis* on *Allium* in Cyprus, 742.

— on cereals in U.S.S.R., 18.

— *cepulae* on onion, legislation against, in Egypt, 544.

[*Urocystis*] *colchici* on *Colchicum autumnale* in Canada, 494; in Holland, 12.

— on *Colchicum bornmulleri* and *C. orientale* in Holland, 12.

— *occulta* on rye in Sweden, 21; in U.S.A., 30.

— *tritici* on wheat, control, 23, 24, 25, 89, 620; cytology of, 296; early symptoms of, 88, 89; effect of, on yield, 24; factors affecting, 24; genetics of resistance to, 295; legislation against, in U.S.S.R., 23; occurrence in Australia, 88, 89, 425; in China, 295; in Cyprus, 83, 741; in Italy, 620; in New S. Wales, 25; in U.S.S.R., 23; in Victoria, 24; study on, 24; varietal resistance to, 24, 295, 425, 620, 742.

*Uromyces* in the Arctic atmosphere, 461.

— *appendiculatus* can infect *Phaseolus lunatus*, 670.

— on bean, control, 670; factors affecting, 747; occurrence in Brazil, 734; in U.S.A., 416, 669; studies on, 416, 669, 734.

— *betae* on beet in Europe, 548.

— *caryophyllinus*, toxicity of various elements to, 244.

— *fabae* f. sp. *viciae septum* can infect broad bean, 141.

— — — on vetch in Switzerland, 141.

— *fallens* on clover, 174.

— *flectens* on clover in U.S.A., distinct from *U. trifolii*, 794.

— *hyalosporus* on *Acacia confusa* in Japan, 612; transference to *Maravalia hyalospora* supported, 612.

— *itoanus* on *Microlespedeza striata* in Japan and *M. stipulacea* in Manchuria, 516.

— *lespedezae-procumbentis* on *Lespedeza* in Japan, 516.

— *minor* on clover in Estonia, 241.

— *musae* on banana in Fiji, 45; in the Philippines, 608.

— *terebinthi* on pistachio nut in Cyprus, 742.

— *trifolii* on clover in Tasmania, 425; in U.S.A., 794; *U. flectens* distinct from, 794.

— *trifolii-repentis* on clover in Estonia, 241.

— *vignae* on cowpea in Cyprus, 742; in Egypt, 614.

*Uromyctadium tepperianum* on *Acacia stricta* in New S. Wales, 134.

*Uropyctis leproides* on beet in Europe, 458; in Tunis, 429.

*Urtica*, see Nettles.

Uspulon, manufacture of, in U.S.S.R., 47.

—, toxicity of, to *Ceratostomella pini*, 276.

—, use of, against *Asterocystis radicis* on cucumber, 212; *Bacterium tumefaciens* on fruit trees, 499; against *Corticium solani* on potato, 527; against *Fusarium culmorum* on asparagus, 735; on barley, oats, and wheat, 688; against *F. rafinfectum* on *Crotalaria juncea* and pigeon pea, 144; against *Helminthosporium* on barley, 80, 299, 688; against *H. sativum* on oats and wheat, 688; against *H.*

— *teres* on barley, 80, 159; against *Urocystis occulta* on rye, 21; against *Ustilago hordei* on barley, 80; against vegetable diseases, 277.

[Uspulon] dust, use of, against *Helminthosporium gramineum* on barley, *Phoma betae* on beet, *Ustilago avenae* on oats, and wheat bunt, 21.

— (U.T. 687), use of, against *Calonectria graminicola* on rye, 21.

— universal, use of, against *Calonectria graminicola* on rye, 20; against *Helminthosporium gramineum* on barley, 20, 21; against *Ustilago avenae* on oats, and wheat bunt, 20.

Ustilaginales of France, 645.

—, physiologic specialization in, 648.

*Ustilago* on cereals in U.S.S.R., 18.

— *avenae* on oats, breeding against, 148, 573; control, 20, 21, 159, 380, 382, 572, 573, 620, 745; effect of, on yield, 573; genetics of resistance to, 29, 231, 573, 574; hybridization of, with *U. kollerii*, 29, 573; method of detecting, in host tissues, 746; occurrence (?) in the Argentine, 29; in Australia, 88; in Canada, 745; in Germany, 20, 231, 620; in India, 160; in New S. Wales, 573; in Queensland, 572; in Rumania, 436; in Sweden, 21; in U.S.A., 29, 148, 382, 497, 573, 574; physiologic forms of, 436, 574; seedling lesions caused by, 88; studies on, 29, 231, 436, 573, 574; varietal resistance to, 231, 436, 497, 573, 574.

— *bromivora* on *Bromus japonicus* in U.S.S.R., 493.

— on *Bromus unioloides* in Queensland, 572.

— *crameri* on *Setaria italica* in China, 691.

— *hordei* on barley, albino strain of, 353; control, 80, 158, 572, 620, 745; genetics of resistance to, 158; hybridization of, with *U. medians*, 352; method of testing resistance to, 623; occurrence in Canada, 158, 623, 745; in China, 745; in Egypt, 158; in Germany, 620; in India, 80; in Queensland, 572; in U.S.A., 352, 353; physiological forms of, 624; study on, 158; varietal resistance to, 158, 623.

— *kollerii* on oats, breeding against, 573; control, 159, 160, 382, 572, 573, 745; effect of, on growth, 436; on yield, 436, 573; factors affecting, 436; genetics of resistance to, 29, 573; hybridization of, with *U. avenae*, 29, 573; occurrence in the Argentine, 29; in Canada, 745; in India, 160; in New S. Wales, 573; in Queensland, 572; in U.S.A., 29, 382, 436, 573; studies on, 29, 436, 573; varietal resistance to, 573.

— *medians* on barley in U.S.A., 352, 353.

— *nuda* on barley, control, 27, 296, 745; factors affecting, 296; occurrence in China, 745; in Denmark, 27; in Germany, 296; in Rumania, 215; in U.S.A., 352; varietal resistance to, 215.

— *penniseti* on *Pennisetum typhoides* in India, 81.

[*Ustilago*] *tritici* on wheat, control, 22, 23, 39, 156, 296, 571, 745; factors affecting, 296; losses caused by, 22; nature of resistance to, 688; occurrence in China, 745; in Germany, 296; in Holland, 89; in India, 22, 156; in Jugo-Slavia, 688; in New S. Wales, 571; in Rumania, 215, 620; in U.S.S.R., 22, 23, 225; physiologic forms of, 620; varietal resistance to, 23, 215, 225, 620.

— *zeae* on maize, effect of, on susceptibility to ear rots, 437; on yield, 354, 436; factors affecting, 690; losses caused by, 94; method of infection by, 94, 750; note on, 355; occurrence in England, 423; in Holland, 11; in Italy, 690; in U.S.A., 94, 354, 436, 504, 750; in U.S.S.R., 493; specialization in, absence of, 355, 504; studies on, 436, 504, 750; varietal susceptibility to, 690.

*Ustulinia* on *Derris microphylla* in Java, 153.

— *vulgaris*, action of, on wood of beech and lime, 667.

— *zonata* on areca palm in Ceylon, 146.

— — on cacao in the British Empire, 87.

— — on oil palm in Malaya, 357.

Vaccines, use of, against dermatophytes, 308. (See also Immunization.)

*Vaccinium*, *Exobasidium vaccinii* on, in U.S.A., 65.

—, mycorrhiza of, 247.

—, see also Cranberry.

— *arboreum*, *Ophiodothella vaccinii* on, in U.S.A., 135.

— *ovatum*, *Exobasidium vaccinii-uliginosum* on, in U.S.A., 66.

— *parvifolium*, *Exobasidium parvifolii* on, in U.S.A., 65.

*Valeriana officinalis*, *Erysiphe valerianae* on, in Estonia, 530.

*Valerianella*, *Aecidium valerianellae* on, in U.S.S.R., 292; (?)aecidial form of *Puccinia glumarum*, 292.

*Valsa* on poplar in Belgium, 478.

— *cincta* on peach in Canada, 594; (?) in Italy, 450.

— *leucostoma* on peach, *Cytospora* (?) *candida* imperfect stage of, 15; occurrence in Argentine, 15; in Canada, 594.

Vanadium pentoxide, use of, with copper sulphide, 675, 740.

Vanillic acid, effect of, on onion pathogens, 553.

Variation in *Aspergillus nidulans*, 523; in *Bacterium medicaginis* var. *phaseolicola*, 289; in *Gibberella saubinetii*, 749; in *Torula pulcherrima*, 523.

—, see also Saltation.

Variegation, infectious, of *Laburnum vulgare* in Bulgaria, 462.

Vasco 4, composition and use of, against damping-off of spinach, 673.

Vegetable marrow (*Cucurbita pepo*), celery virus 1 on, in U.S.A., 615.

— —, *Colletotrichum lagenarium* on, in U.S.S.R., 344.

— —, diseases of, in England, 414.

— —, (?) *Erysiphe cichoracearum* on, in England, 9.

[Vegetable marrow], mosaic of, in Italy, 489; transmission of, by *Aphis gossypii*, 489.

— —, *Sclerotinia sclerotiorum* on, in U.S.A., 420.

— —, see also Squash.

Vegetables, diseases of, control, 276; occurrence in Germany, 276, 424; in U.S.A. (in storage), 322, 461.

Veinbanding of potato, infection radius of, 190; occurrence in Australia, Brazil, Bulgaria, England, Germany, and Holland, 524; in U.S.A., 190, 287; relation of, to cucumber mosaic, 782; to potato virus Y, 246, 524; to tobacco virus 10729 (Valleau's), 782; serological studies on, 385, 782; varietal resistance to, 287.

— of tobacco, cytology of, 246; occurrence in Rhodesia, 677; in U.S.A., 685, 723; relation of, to potato virus Y, 246; to tobacco mosaic, 677; spread of, from potatoes, (?) 677, 685, 723; varietal susceptibility to, 660.

*Venturia* in the Arctic atmosphere, 461.

— *cerasi* on cherry in Germany, 317, 589.

— *chlorospora* on *Salix* in England, 479.

— *inaequalis* on apple, ascospore discharge of, 496, 589, 590; breeding against, 241; control, 111, 148, 150, 218, 242, 371, 381, 382, 452, 495, 496, 517, 562, 589, 590, 677, 683, 700, 769; development of, in storage, 111; dissemination of, 50, 589; factors affecting, 317, 590; legislation against, in England, 336, 672; losses caused by, 241; notes on, 316; occurrence in the Argentine, 371; in Bulgaria, 50; in Canada, 495; in England, 111, 242, 590, 672, 769; in Germany, 241, 316, 317, 371, 517, 589, 677, 700; in Holland, 13, 40; in Peru, 315; in Scotland, 769; in Switzerland, 589; in U.S.A., 148, 150, 218, 381, 382, 452, 496, 562, 590, 683; overwintering of, 40; physiologic forms of, 242, 316; studies on, 241; specific and varietal susceptibility to, 111, 241.

— *pirina* on pear, ascospore discharge of, 590; control, 43, 79, 315, 454, 517, 589, 590; factors affecting, 317; legislation against, in England, 336, 672; occurrence in the Argentine, 371; in Australia, 43; in Austria, 772; in England, 672; in France, 454; in Germany, 79, 317, 517, 589; in Holland, 13, 40; in Switzerland, 590; in Western Australia, 315; overwintering of, 40; varietal resistance to, 454, 772.

Veratric acid, effect of, on onion pathogens, 553.

*Verbena*, tomato spotted wilt can infect, 404.

Verderame sulphur dust, use of, against *Botrytis cinerea* on vine, 213, 491.

*Vermicularia polystricha* and *V. truncata* synonyms of *Colletotrichum truncatum*, 416.

Vermorel Aquilon, Bluette, and Blufina dusting apparatus, 716.

*Verticillium*, action of, on *Corticium solani*, 188.  
 — in butter, 761.  
 — on beet in Belgium, 549; (?) in Europe, 548; in Holland, 549.  
 — on elm in U.S.A., 203.  
 — on mushrooms, control, 345; factors affecting, 555; note on, 491; occurrence in France, 490, 554; in Great Britain, 346; studies on, 346, 554.  
 — on pineapple in Hawaii, 455.  
 — *albo-atrum* on *Acer campestre*, *A. negundo*, *A. platanoides*, and *A. pseudoplatanus* in Italy, 265.  
 — — — on aster, China, in Germany, 447.  
 — — — on cotton, control, 629; occurrence (?) in the Belgian Congo, 224; in Brazil, 87, 629; in U.S.A., 629.  
 — — — on eggplant, control, 74, 283, 684; factors affecting, 74; occurrence in U.S.A., 74, (?) 283, 684; varietal susceptibility to, 74.  
 — — — on elm, 664; in U.S.A., 406.  
 — — — on melon in U.S.A., 283.  
 — (?) — — on pear in Italy, 641.  
 — — — on potato in New Zealand, 466, 717.  
 — — — on tobacco in U.S.A., 200.  
 — (?) — — on tomato in U.S.A., 283.  
 — — —, physiology of, 765.  
 — *amaranti* on *Amaranthus tricolor* in Italy, 765.  
 — *chlamydosporum* in soil, 392.  
 — *cinerascens* on carnation in England, 636.  
 — (?) *dahliae* on eggplant in U.S.A., 283.  
 — — — on horse-radish in Germany, 419.  
 — — — on melon in France, 77.  
 — (?) — — on tomato in U.S.A., 283.  
 — — —, physiology of, 765.  
 — *fuliginosum* on a leafhopper in Panama and Surinam, 443.  
 — *lateralitium*, physiology of, 124.  
 — *ovatum* on raspberry in U.S.A., 181.  
 — *tracheiphilum*, physiology of, 765.  
 Vetch (*Vicia* spp.), *Ascochyta* on, in U.S.A., 428, 683.  
 —, — *viciae* on, in Europe and U.S.A., 219.  
 —, *Corticium solani* can infect, 603.  
 —, *Mycosphaerella pinodes* on, in U.S.A., 683.  
 —, *Rhizoctonia* on, in U.S.A., 219.  
 —, *Uromyces fabae* f. sp. *viciae sepium* on, in Switzerland, 141.  
*Vialaella glomerata*, *Dematophora glomerata* renamed, 196.  
*Viburnum opulus*, *Phomopsis* on, in U.S.A., 174.  
*Vicia* spp., see Vetch.  
 — *faba*, see Bean.  
*Vigna*, *Macrophomina phaseoli* on, in Cyprus, 83.  
 — *unguiculata* (*V. catjang*), see Cowpea.  
*Villebrunnea frutescens* var. *concolor*, *Ascochyta boehmeriae* can infect, 512.  
*Vinca rosea*, celery virus 1 on, in U.S.A., 615.  
 — — —, *Phytophthora parasitica* var. *piperrina* can infect, 717.  
 — — —, spike disease of, in India, 539, 801.  
 Vine (*Vitis*), 'anthracnose déformée' of, in France, 77.  
 —, '— ponctuée' of, in Italy, 680.  
 — apoplexy (non-parasitic) in Cyprus, 347.  
 —, *Bacterium tumefaciens* on, note on, 499; occurrence in Germany, 740; relation of, to 'broussin' tumours, 676.  
 —, *Bornetina corium* on, in Palestine, 357.  
 —, *Botrytis cinerea* on, control, 11, 145, 213, 491; occurrence in Austria, 11; in France, 145; in S. Africa, 213, 491; study on, 213; varietal susceptibility to, 213.  
 —, 'broussins' of, in France, 676.  
 —, 'brunissure' of, in France, 214.  
 —, burning-back of, in Australia, 520.  
 — chlorosis in France, 214.  
 —, *Cladosporium herbarum* on, in storage, in France, 492.  
 —, *Clitocybe tabescens* on, in U.S.A., 86.  
 —, court-noué of, attributed to *Pumilus medullae*, 8, 675; to a virus, 8; control, 272, 347; cytological study on, 616; mycorrhizal endophyte in relation to, 8; occurrence in Australia, 8; in France, 272, 346, 675; in Germany, 79; in Italy, 616; varietal resistance to, 347.  
 —, cracking (non-parasitic) of, in Italy, 11.  
 —, *Dematophora glomerata* on, in Italy, 196; renamed *Vialaella glomerata*, 196.  
 —, *Elsinoe ampelina* on, see *Gloeosporium ampelophagum*.  
 —, fungal wastage of, in England, 322; in S. Africa, 491.  
 —, *Gloeosporium ampelophagum* on, control, 315, 617, 814; *Manginia ampelina* pycnidial form of, 617; occurrence in Germany, 557; in Italy, 616; in Venezuela, 397; in Victoria, 814; in Western Australia, 315; study on, 616; varietal susceptibility to, 814.  
 —, *Guignardia bidwellii* on, control, 10; note on, 10; occurrence in Brazil, 87; in the Caucasus, France, and Germany, 557; in Italy (denied), 557; in Jugoslavia, 491; in Spain, 557; in U.S.A., 10.  
 —, leaf roll of, in Germany, 79; in Italy, 679.  
 —, little leaf of, control, 176, 767, 768; 'corral spot sickness' may be identical with, 767; occurrence in U.S.A., 176, 767, 768.  
 —, *Microascus* on, in Italy, a constituent of *Dematophora glomerata*, 196.  
 —, moulds on, in storage, in Italy, 422.  
 —, mycorrhiza of, in relation to court-noué, 8.  
 —, *Penicillium* on, in S. Africa, 213.  
 —, — *glaucum* on, in S. Africa, 491.  
 —, *Phoma flaccida* on, control, 347, 675; occurrence in France, 346, 675; in S. Africa, 426.  
 —, pith disease of, in Austria, 675.  
 —, *Plasmopara viticola* on, breeding against, 285; control, 10, 47, 49, 75, 77, 79, 244, 420, 421, 424, 454, 556, 557, 674, 675, 740, 814; factors affecting, 75, 77, 325, 420, 424; forecasting attacks of, 420; occurrence in Canada, 324; in France, 75, 77, 244, 420, 421, 454, 556,

674, 675, 740, 814; in Germany, 79, 285, 557; in Italy, 75, 424, 610; in Malta, 618; in Rumania, 49; in Switzerland, 244; in Tanganyika, 679; in U.S.S.R., 10; in Venezuela, 398; in Victoria, 814; phenology of, 10, 75, 77, 420; study on, 421.

[Vine], *Pseudopeziza tracheiphila* on, in Germany, 285.

—, *Pumilus medullae* on, relation of, to court-noué, 8, 675.

—, *Rhizopus* on, in S. Africa, 213.

—, 'roncet' of, see leaf roll of.

—, scald of, in Italy, 422.

—, 'schwarzer Brenner' of, in Germany, 676.

—, *Stysanus stemonites* on, in Italy, a constituent of *Dematophora glomerata*, 196.

—, *Uncinula necator* on, breeding against, 285; control, 9, 75, 315; occurrence in England, 9; in Germany, 285; in Hungary, 741; in Italy, 75; in Malta, 618; in Western Australia, 315; perithecial production by, 741; varietal resistance to, 285.

*Viola cornuta*, beet curly top affecting, in U.S.A., 171.

— *tricolor*, see Pansy.

Violet (*Viola*), *Sphaceloma violae* on, in New S. Wales and U.S.A., 764.

Virescence of tobacco identical with tomato woodiness, 131.

Virulent latent virus of potato affecting tomato in Canada, 261; (?) identical with 'healthy potato' virus, potato virus X, and tobacco ring spot, 261; virulent X virus proposed as a name for, 262.

(?) Virus disease of apricot in Italy, 455.

(?) —— of areca palm in Ceylon, 145.

— of beet in Czechoslovakia, 548.

— of *Brassica* spp., Brussels sprouts, and cabbage in England, 669; transmission of, by *Myzus persicae* and sap, 669; to *Nicotiana glutinosa*, *N. langsdorffii*, and tobacco, 669.

— of cauliflower in U.S.A., 207; transmission of, to cabbage, kale, and *Matiola incana*, 207.

— of *Cestrum parqui* in Italy, 781.

(?) —— of cherry in Italy, 455; in U.S.A., 288.

— of chilli in Rumania, 215.

— of eggplant in Rumania, 215.

(?) —— of hops in England, 423.

— of papaw in Burma, 286.

— of peony in France, 199; relation of, to potato virus X, 199; transmission of, to *Petunia*, 200; to tobacco, 199.

— of *Petunia hybrida* in Bermuda, 560; transmission of, to *Antirrhinum majus*, 560.

(?) —— of pine in New S. Wales and Queensland, 425.

(?) —— of plum in Italy, 455.

— of tomato in England, 724.

— diseases, bibliography of, 51.

— of banana in Queensland, 596.

— of blackberry in U.S.A., 642.

[Virus diseases] of citrus, 505.

— of dewberry in U.S.A., 642.

— of peas, included in 'St. John's disease', 613.

— of potato, breeding against, 222; classification of, 116; comparative studies on, 523; control, 525, 714, 784; masking of symptoms of, 714; occurrence in Australia, Brazil, and Bulgaria, 523; in Canada, 465, 525; in England, Germany, Holland, Irish Free State, and Japan, 523; in U.S.A., 222, 714, 784; in U.S.S.R., 117, 523; '*Pseudocommis vitis*' (?) identical with intracellular bodies in, 117; recent work on, 54; tuber-indexing against, 525, 714; varietal resistance to, 222.

— of raspberry in Canada, Great Britain, and U.S.A., 642.

(?) —— of tomato in U.S.S.R., 131.

— of weeds in India, in relation to sandal spike, 265.

—, reviews of work on, 399, 710, 780.

Viruses, antigenicity of, 782.

—, classification of, 521, 781.

—, comparison of, with bacteriophage, 185.

—, concentration of, in relation to number of lesions produced, 601, 781.

—, protoplasmic bridges in relation to infection by, 51.

*Volvaria volvacea*, cultivation of, in India, 286; in Malaya, 490.

Vomasol C, use of, against *Gloxinia* on *Phytophthora speciosa*, 637.

Wacker's Bordeaux, 79.

— Haftmittel W, use of, as adhesive, 489.

Wallflower (*Cheiranthus cheiri*), *Phoma lingam* can infect, 547.

—, *Pythium ultimum* on, in U.S.A., 383.

Walnut (*Juglans*), *Ascochyta juglandis* on, in Germany, 204.

—, *Bacterium juglandis* on, in Australia, Holland, New Zealand, and Switzerland, 204; in U.S.A., 204, 477.

—, *rhizogenes* on, in U.S.A., 288.

—, *tumefaciens* on, in U.S.A., 289.

—, *Botryosphaeria ribis chromogena* on, in U.S.A., 196.

—, *Chalaropsis thielavioides* on, in England, 408, 801.

—, *Fomes fomentarius* on, in U.S.S.R., 62.

—, *igniarius* on, in U.S.S.R., 662.

—, *Ganoderma applanatum* on, in U.S.S.R., 62.

—, *Gloeosporium epicarpii* on, in Germany, 204.

—, *Gnomonia leptostyla* on, in Germany, 203.

—, *Hendersonula toruloides* on, in Cyprus, 83.

—, *Hydnomyces ochraceum* on, in U.S.S.R., 62.

—, little leaf of, control, 176, 767, 768; 'corral spot sickness' may be identical with, 767; occurrence in U.S.A., 176, 767, 768.

—, *Microstroma juglandis* on, in Germany, 204.

[Walnut], *Naemospora* on, in Cyprus, 742.  
 —, *Nectria* on, in U.S.A., 663.  
 —, — *galligena* on, in U.S.A., 407.  
 —, *Phytophthora cambivora* on, in Italy, 680.  
 —, *Polyporus fumosus* on, in U.S.S.R., 62.  
 —, *Poria subacida* on, in U.S.A., 805.  
 Wasting disease of *Zostera marina*, see Dying-off of.  
 Water, bacteriophage of *Bact. malvacearum* in, from the Blue Nile, 757.  
 —, *Cadophora fastigiata* in, in Sweden, 140, 275.  
 —, — *obscura* in, in Sweden, 275.  
 —, *Discula pinicola* in, in Sweden, 274.  
 —, *Sporotrichum biparasiticum* in, in Algeria, 168.  
 Water-core of apple as a prerequisite of crinkle (q.v.), 242; control, 520; factors affecting, 520, 701; occurrence in Australia, 520; in U.S.A., 592, 701; study on, 701.  
 — breakdown of apple in Australia, 243; types of, 243.  
 Watercress (*Nasturtium officinale*), Pythiaceous fungus on, in Denmark, 559.  
 Watermelon (*Citrullus vulgaris*), celery virus 1 on, in U.S.A., 615.  
 —, *Colletotrichum lagenarium* on, in S. Africa, 426.  
 —, cucumber virus 4 can infect, in England, 554.  
 —, *Diplodia* can infect, 564.  
 —, *Fusarium* on, in U.S.S.R., 343.  
 —, — [*bulbigenum* var.] *niveum* on, breeding against, 216, 220; control, 344; factors affecting, 86; note on, 349; occurrence in Japan, 143; in Queensland, 216; in S. Africa, 426; in U.S.A., 86, 220, 349; in U.S.S.R., 343; study on, 143; systemic invasion by, 143; varietal resistance to, 216, 220, 426.  
 —, *Phytophthora omnivorum* on, antagonism of *Trichoderma lignorum* to, 739; occurrence in U.S.A., 738.  
 —, *Pythium aphanidermatum* can infect, 7.  
 Water spot of orange in U.S.A., 234, 578.  
 'Waxahachie wilt' of cotton in U.S.A., 562.  
 Weizenfusariol, effect of, on metals and vice versa, 597.  
 'Wet wood' of pine and spruce in Finland, Lapland, Norway, and Sweden, fungi associated with, 803.  
 Wheat (*Triticum*), *Alternaria* on, in Algeria, 91; in New S. Wales, 623.  
 —, — (?) *peglionii* on, in Algeria, 91.  
 —, *Aspergillus* on, in U.S.S.R., 298.  
 —, — *repens* on, in Algeria, 91.  
 —, bacteria on stored, in U.S.S.R., 297.  
 —, bacterial rot of, in Algeria, 91.  
 —, *Bacterium atrofaciens* on, in the U.S.S.R., (?) 297.  
 —, — *setariae* can infect, 356.  
 —, — (?) *translucens* on, in U.S.S.R., 17.  
 —, — var. *undulosum* on, in New S. Wales, 571; (?) in U.S.S.R., 297.  
 —, (?) basal glume rot of, in Kenya, 427.  
 [Wheat], brown neck in Tunis, 429.  
 —, *Calonectria graminicola* var. *neglecta* on, in U.S.S.R., 297.  
 —, celery virus 1 can infect, 93; occurrence on, in U.S.A., 615.  
 —, *Cercospora herpotrichoides* on, control, 230, 351, 570, 748; factors affecting, 230, 351, 424, 570, 748; note on, 689; occurrence in France, 424, 502; in Germany, 230, 351, 570, 748; in U.S.A., 230; study on, 230; varietal resistance to, 230.  
 —, *Cladosporium* on, in Algeria, 91.  
 —, *Colletotrichum graminicolum* on, in Canada, 494.  
 —, *Corticium solani* on, in New S. Wales, 622; in S. Australia, 559; resistance to, 603.  
 —, (?) *Cortinarius* on, in England, 621.  
 —, *Curvularia ramosa* and *C. spicifera* on, in New S. Wales, 622.  
 —, *Dilophia graminis* on, in Italy, 750.  
 —, *Dilophospora alopecuri* on, in Germany, 296.  
 — diseases, breeding against, 349; losses caused by, in U.S.A., 780; occurrence in Kenya, 744.  
 —, 'dry land' foot rot of, in U.S.A., 497.  
 —, *Erysiphe graminis* on, effect of, on resistance to *Puccinia triticina*, 88; factors affecting, 26; genetics of resistance to, 229; nature of resistance to, 26, 711; occurrence in Germany, 26; in Tasmania, 425; in U.S.A., 88, 229; in U.S.S.R., 225; physiologic forms of, 229; study on, 229; varietal resistance to, 26, 225, 229.  
 —, *Fusarium* on, control, 157; effect of, on yield, 748; factors affecting, 157, 297; note on, 748; occurrence in Canada, 748; in France, 570; in Germany, 157; in U.S.S.R., 225, 297; study on, 297; varietal resistance to, 225.  
 —, — *cultorum* on, control, 688; occurrence in Canada, 688; in New S. Wales, 622; in Rumania, 215; in U.S.S.R., 297.  
 —, — *poae* on, in the Argentine, 720.  
 —, — *solani* var. *minus* on, in U.S.S.R., 297.  
 —, *Gibberella fujikuroi* var. *subglutinans* on, in the Argentine, 15.  
 —, — *moniliformis* on, in U.S.S.R., 297.  
 —, — *saubinetii* on, in the Argentine, 720; in Belgium, 679; in Japan, 296; specialization in, 296.  
 —, *Gibellina cerealis* on, in Hungary and Italy, 26; (?) in U.S.A., 26.  
 —, grey speck of, in Western Australia, 122.  
 —, *Helminthosporium* M on, see *Curvularia ramosa* on.  
 —, — *sativum* on, antagonism of *Trichothecium roseum* to, 569; control, 222, 688; effect of, on germination, 673; on yield, 748; notes on, 298, 748; occurrence in Burma, 286; in Canada, 298, 569, 688, 748; in India, 91; in New S. Wales, 622, 623; in U.S.A., 222; physiologic forms of, 622.

[Wheat, *Helminthosporium*] *tetramera* on, in New S. Wales, 622; referred to *Curvularia spicifera*, 622.

—, — *tritici-repentis* on, in India, 90; *Pyrenophora* ascigerous stage of, 91.

—, *Hendersonia herpotricha* on, in Sweden, 352.

—, *Macrosporium* on, in Algeria, 91.

—, manganese injury to, in Germany, 404.

—, (?) *Micrococcus tritici* on, in U.S.S.R., 297.

—, mosaic, cell inclusions in, 618; occurrence in Japan, 618; in U.S.S.R., 493.

—, 'moucheture' of, in Algeria, 91.

—, *Nematosporangium* on, in Japan, 498.

—, *Ophiobolus graminis* can infect, 503.

—, — on, antagonism of soil organisms to, 517, 689; control, 157, 230, 351, 497, 621, 689; factors affecting, 157, 230, 351, 352, 424, 433, 497, 621, 689; note on, 502, 748; occurrence in Belgium, 679; in Canada, 748; in England, 621; in France, 424, 502, 570; in Germany, 157, 229, 351; in Kenya, 427; in New S. Wales, 622; in Sweden, 352; in U.S.A., 497; study on, 157.

—, — *herpotrichus* on, in Sweden, 352.

—, *Penicillium* on, in U.S.S.R., 298.

—, *Pleospora* on, in Algeria, 91.

—, *Pseudomonas tritici* on, (?) in Cyprus, 742; in India, 571.

—, *Puccinia* on, in Rhodesia, 678; sporulation in, 52.

—, — *agropyri* can infect, 501.

—, — *glumarum* on, breeding against, 227, 294, 567; control, 293; effect of, on yield, 18; factors affecting, 20, 214, 423, 748; genetics of resistance to, 294; germination of teleutospores of, 619; method of determining losses caused by, 291; occurrence in the Argentine, 500; in Austria, 19, 748; in France, 20, 77, 423; in Germany, 294; in Italy, 293, 619; in Kenya, 427; in Madagascar, 87; in Rumania, 214; in U.S.S.R., 18, 225, 291; overwintering of, 20; physiologic forms of, 20; varietal resistance to, 77, 215, 225, 431, 500.

—, — *graminis* on, artificial production of an epidemic of, 226; breeding against, 225, 427, 431, 567, 619; control, 18, 293, 350, 815; by dusting, 18; effect of, on yield and weight of grain, 568; factors affecting, 20, 88, 214, 225, 226, 293, 350, 423, 568, 687, 747; genetics of resistance to, 155, 619; legislation against, in New S. Wales, 815; losses caused by, 18, 88; nature of resistance to, 225, 226, 293; occurrence in Austria, 19, 499; in Canada, 225, 226; in Europe, 88; in France, 77, 423; in Germany, 88; in Italy, 293; in Kenya, 226, 427, 431; in Madagascar, 87; in Mexico, 350; in New S. Wales, 618, 815; in Rumania, 214; in U.S.A., 350; in U.S.S.R., 18, 225; in Victoria, 568; overwintering of, 215, 499; physiologic forms of, 350, 427, 431, 618; studies on, 155, 225, 226, 687; varietal resistance to, 77, 155, 215, 225, 226, 350, 431.

[Wheat, *Puccinia*] *persistens* on, in France, 645.

—, — *secalina* on, differential reactions to physiologic forms of, 300.

—, — *triticina* on, breeding against, 225, 227, 497, 567; control, 293, 500; effect of infection by *Erysiphe graminis* on resistance to, 88; of, on physiology of host, 432, 567; on yield, 18, 432, 567; factors affecting, 19, 88, 156, 214, 497, 747, 748; genetics of resistance to, 227, 229; germination of teleutospores of, 619; method of determining losses caused by, 291; occurrence in Austria, 19, 156, 499, 500, 748; in France, 77, 645; in Germany, 227; in Hungary, 748; in Italy, 293; in Japan, 59, 299; in Madagascar, 87; in Rumania, 214, 227; in Sicily, 619; in U.S.A., 88, 229, 432, 497, 567; in U.S.S.R., 18, 225, 291, 292; overwintering of, 214, 499; physiologic forms of, 227, 497, 748; varietal resistance to, 77, 215, 225, 227, 432.

—, *Pythium* on, in Canada, 748; in Japan, 498.

—, — *arrhenomanes* on, in Canada, 494.

—, reclamation disease of, in Germany, 255.

—, *Sclerotium rolfsii* on, in the Philippines, 315.

—, *Septoria nodorum* on, in Tanganyika, 678; in U.S.A., 348.

—, *Tilletia caries* on, breeding against, 286, 681; control, 20, 21, 22, 48, 89, 90, 114, 228, 287, 380, 501, 572, 620, 745; cytology of, 433; effect of, on susceptibility to *Puccinia triticina*, 227; factors affecting, 22, 681; genetics of resistance to, 286; heterothallism in, 432; hybridization of, with *T. foetens*, 433; new variety of, 350; notes on, 502; occurrence in the Argentine, 626; in Australia, 88; in Austria, 501; in Canada, 495, 745; in China, 745; in Czecho-Slovakia, 90, 228; in France, 77; in Germany, 20, 380, 620; in Italy, 114; in Queensland, 572; in Rumania, 502; in Sweden, 21; in U.S.A., 89, 286, 350, 681; in U.S.S.R., 22, 225; in Victoria, 22; physiologic forms of, 287, 626, 681; seedling lesions caused by, 88; strains of, 77; study on, 227; varietal resistance to, 225, 495.

—, — *foetens* on breeding against, 228, 681; control, 20, 21, 22, 89, 287, 380, 382, 501, 562, 572, 745; cytology of, 433; factors affecting, 22, 681; heterothallism in, 432; hybridization of, with *T. caries*, 433; notes on, 502; occurrence in the Argentine, 626; in Austria, 501; in Canada, 745; in China, 745; in Germany, 20, 380; in Queensland, 572; in Rumania, 502; in Sweden, 21; in U.S.A., 89, 227, 287, (?) 382, 562, 681; in U.S.S.R., 22, 225; physiologic forms of, 227, 287, 626, 681; study on, 227; varietal resistance to, 225, 228.

—, — *indica* on, in India, 80.

—, *Urocystis tritici* on, breeding against, 295; control, 23, 24, 25, 89, 620; cyto-

logical study on, 296; early symptoms of, 88, 89; effect of, on yield, 24; factors affecting, 24; genetics of resistance to, 295; legislation against, in U.S.S.R., 23; occurrence in Australia, 88, 89, 425; in China, 295; in Cyprus, 83, 741; in Italy, 620; in New S. Wales, 25; in U.S.S.R., 23; in Victoria, 24; study on, 24, 295; varietal resistance to, 24, 295, 425, 620, 742.

[Wheat], *Ustilago tritici* on, control, 22, 23, 89, 156, 296, 571, 745; factors affecting, 296; losses caused by, 22; nature of resistance to, 688; occurrence in China, 745; in Germany, 296; in Holland, 89; in India, 22, 156; in Jugoslavia, 688; in New S. Wales, 571; in Rumania, 215, 620; in U.S.S.R., 22, 23, 225; physiologic specialization in, 620; varietal resistance to, 23, 215, 225, 620.

—, *Verticillium amaranti* producing substances inhibiting germination of, 765.

—, 'wind-injury' of, in Australia, 520.

—, *Wojnowicia graminis* on, in Australia, 425; in England and Wales, 492; in U.S.A., 569.

'White bud' of maize in U.S.A., 576.

— spotting of clover, grasses, and oats in Germany, 572.

— stripe of maize in Cuba, 93.

*Willia*, serological reaction of, 34.

Willow, see *Salix*.

Wilt of cacao in Ceylon, 17.

— of cotton in the Sudan, 358, 756.

— of olive in Italy, 680.

— of pineapple, *Heterodera marionii* and *Lepidiota* in relation to, 457; occurrence in Queensland, 216, 457; types of, 455.

— of plum in Italy, see Leptonecrosis of.

'Wind injury' of wheat in Australia, 520.

Witches' broom of lucerne in New S. Wales, 516.

— of potato in Italy, 786; in U.S.A., 784.

— of *Robinia pseud-acacia* in Bulgaria, 462.

*Wojnowicia graminis* can infect *Hordeum murinum* and other grasses, 425.

—, *Hendersonia* spp. on Gramineae probably strains of, 569.

— on *Agropyron inerme*, *A. riparium*, barley, *Bromus tectorum*, *Koeleria cristata*, oats, *Poa sandbergii*, and rye in U.S.A., 569.

— on wheat in Australia, 425; in England and Wales, 492; in U.S.A., 569.

—, physiologic forms of, 569.

Wood pulp, see Timber.

Woodiness of tomato, control, 132; effect of, on yield, 132; nature of virus of, 133; notes on, 132; occurrence in U.S.S.R., 128, 130, 131, 132, 133, 724; relation of, to tobacco female sterility virus, tobacco virescence, and tomato big bud, 131; studies on, 128, 130, 724; transmission of (?) by *Agallia sinuata*, 130; virus of, affecting *Atropa belladonna* in U.S.S.R., 131; *Convolvulus arvensis* in U.S.S.R., 131, 724; *Datura*, Solanaceae, and tobacco in U.S.S.R., 131.

Wood's rays, use of, in differentiation of dermatophytes, 510. See also Ultra-violet rays.

Woody gall of guava in Brazil, 778; (?) Phycomycete in relation to, 778.

Wool mildew in France, 762.

Wound cork formation in potato, effect of ultra-violet rays on, 467.

Wounds of trees, treatment of, in U.S.A., 266.

Wyojel, use of, with fungicides, 382.

X-bodies, artificial production of, in beet seedlings, 116.

— in wheat mosaics in Japan, 618.

X-rays, effect of, on *Mucor paronychius*, 236.

—, use of, in chromosomal location of a gene, 626.

X virus of potato in Belgium, 185; in Canada, 605; in Germany, 388; protective action of, 330, 388; relation of, to 'healthy potato' virus, 661; to peony virus disease, 199; to potato crinkle, 246; to potato interveinal mosaic, 605; to potato virulent latent virus, 261; to tomato streak (mixed virus), 261, 262; serological studies on, 185, 713; transmission of, by grafting and rubbing, 388; by sap, 605; to *Datura stramonium* and *Nicotiana glutinosa*, 262, 713; to tobacco, 262, 327, 388, 713; to tomato, 262.

— on tomato in Canada, 261.

*Xanthium canadense*, *Rhizoctonia microsclerotia* on, in U.S.A., 417.

*Xanthosoma sagittifolium*, *Corticium solani* on, in the Gold Coast, 14.

—, *Scleroconium venezuelanum* on, in Venezuela, 470.

'Xylamon-Feuerschutz', composition and use of, as a timber preservative, 667.

*Xylaria* on *Derris microphylla* in Java, 153.

— *mali* on apple, factors affecting, 373.

— *thwaitesii* on coffee in Java, 743.

— *vaporaria* in mushroom-beds, control, 345, 555; notes on, 555; occurrence in England, 555; in Great Britain, 346; not in U.S.A., 739.

*Xyleborus*, *Ambrosiaemyces zeylanicus* on, in Ceylon, 167.

— *dispar* in relation to *Ceratostomella catoniana* on pear, 374.

'Xyloporosis' of lime in Cyprus, Palestine, and Syria, 162.

— of orange in Palestine, 162.

Y virus of potato, cytological effects of, 246; occurrence in Belgium, 185; in France, 327; in Germany, 388; relation of, to potato crinkle, 186, 246; to tobacco veinbanding, 246, 524; serological studies in, 185, 327; transmission of, by *Myzus persicae*, to tobacco, 186, 246; to other Solanaceae, 246.

Yams (*Dioscorea*), bacteria on, in Nigeria, 217.

—, *Cercospora ubi* on, in Japan, 472.

[Yams], *Corticium solani* and *Fusarium oxysporum* on, in Nigeria, 217; *Hoplo-laimus bradys* in relation to, 217.

Yeast, *Isaria cretacea* on, in England, 471.

— on *Nephelium litchi* in S. Africa, 426.

Yeasts, a monograph on the anasco-sporogenous, 192.

— in butter in relation to creamery sanitation, 633.

— in the upper air in U.S.A., 326.

— on *Ips* spp. and mites in timber in U.S.A., 138.

— on man in Hungary, 104.

— on stored fruits and vegetables in U.S.A., 322.

Yellow crinkle of papaw in Queensland, 216.

— dwarf of onion, intracellular abnormalities in, 810; occurrence in U.S.A., 51, 810; transmission of, by aphids, 51; by *Aphis rumicis* and *Myzus persicae*, 51.

— — — of potato in U.S.A., 147, 190; transmission of, by *Myzus persicae*, 190.

— edge of strawberry in England, 180, 595; (?) in New Zealand, 179; transmission of, by *Capitophorus fragariae*, 179, 596.

(?) — flat of lily in Java, 153.

— mosaic suggested as name for tomato aubera mosaic, 261.

— spot of beet in Belgium and Holland, 549.

— virus disease of pineapple in Hawaii, 456.

— stripe of narcissus in England, 366.

Yellowing disease of *Beta trigyna* in Belgium, 342.

Yellow of aster in U.S.A., 171, 312, 313; transmission of, by *Cicadula sexnotata*, 171, 312, 313; by *Thamnotettix montanus*, 313; to carrot, 312; to celery, 171, 312, 313; to potato, 312; virus of, affecting *Eschscholtzia californica*, *Godezia grandiflora*, and *Tagetes erecta*, in U.S.A., 171.

— of beet, effect of, on yield, 549; etiology of, 417, 548, 549; occurrence in Belgium, 72, 342, 549; in England, 548; in Europe, 548; in France, 327; in Germany, 417, 549; in Holland, 12, 209, 417, 549; in Spain, 417; serological study on, 327; studies on, 209, 417; transmission of, by *Aphis fabae*, 548; by juice, 342; types of, 209, 548, 549.

— of carrot in U.S.A., 312, 313; transmission of, by *Cicadula sexnotata*, 312; by *Thamnotettix geminatus*, 313; to aster, 312.

— of celery, factors affecting, 737; occurrence in U.S.A., 312, 313, 737; study on, 737; transmission of, by *Thamnotettix montanus*, 313; to aster, 312, 313; to carrot, lettuce, mustard, *Plantago major*, and spinach, 313; varietal resistance to, 737.

— of peach, control, 374, 705; occurrence in U.S.A., 219, 374, 704, 705; transmission of, by budding, 705; by *Macropsis trimaculata*, 498, 682, 704, 705; virus of, affecting plum in U.S.A., 682, 704;

*Prunus munsoniana* in U.S.A., 682; *P. salicina* in U.S.A., 682, 705.

[Yellows] of strawberry in U.S.A., 288, 684.

Yew (*Taxus baccata*), *Polyporus sulphureus* on, in U.S.S.R., 62.

Yoghourt, see Milk.

York spot of apple in U.S.A., 592.

*Yucca*, *Corticium centrifugum* on, in Japan, 719.

*Zantedeschia aethiopica*, mosaic of, in U.S.A., 587.

— — —, tomato spotted wilt affecting, control, 725; occurrence in England, 366, 662, 725; in U.S.A., 201, 212; transmission of, by *Thrips tabaci*, 367.

*Zea mays*, see Maize.

'Zealand disease' of beet renamed yellowing, 209.

Zein, effect of, on soil microflora, 392.

*Zephyranthes candida*, *Stagonospora curtissii* can infect, 448.

Zinc, effect of fungicides on, and vice versa, 591.

—, use of, against little leaf of fruit trees, 768.

— ammonia, use of, against little leaf of pecan, 767.

— chloride, consumption of, in U.S.A., 707.

— — —, use of, against *Bacillus amylovorus* on pear, 497; against *Polystictus versicolor* on timber, 413; as a timber preservative, 138, 542, 545, 667.

— deficiency in relation to little leaf and rosette of other fruit trees, 767; to mottle leaf of citrus, 302; to plant diseases, 469.

— fluoride and zinc fluosilicate, use of, as timber preservatives, 542.

— hydroxide as a constituent of Vasco 4, 673.

— — —, use of, against damping-off of spinach, 673.

— meta-arsenite, use of, as a timber preservative, 667.

— oxide as a constituent of Vasco 4, 673.

— — —, use of, against damping-off of spinach, 673; against little leaf of vine, 767; of peach, 176; against mildew on paint, 520; against *Pythium ultimum* on antirrhinum, beet, celery, chilli, crucifers, eggplant, lettuce, rhododendron, salvia, tomato, and wallflower, 383; in soil disinfection, 382.

— salicylate, use of, against wheat bunt, 228.

— sulphate, mixture of ferrous sulphate with, 768.

— — —, toxicity of, to *Pseudomonas mors-prunorum*, 641.

— — —, use of, against *Bacterium pruni* on peach, 682; on plum, 641; against bronzing of *Aleurites fordii*, 481; against chlorosis of *A. montana* and orange, 481; against *Cladosporium carpophilum* on peach, 683; against court-noué of vine, 272, 347; against frenching of grapefruit and orange, 441; against little leaf of almond, 176; of apple and

apricot, 176, 768; of fruit trees, 318, 767, 768; of peach, 176, 768; of plum, 42, 176, 768; of vine, 176, 767, 768; of walnut, 176, 768; against mottle leaf of citrus, 302, 506, 628, 753; against pecan rosette, 538; against 'white bud' of maize, 576.

[Zinc] sulphide, use of, against little leaf of vine, 767.

Zinganelite, use of, against *Botrytis cinerea* on vine, 213.

*Zingiber officinale*, see Ginger.

*Zinnia*, *Bacterium solanacearum* on, in Italy, 681.

—, tobacco virus 6 can infect, 600.

—, tomato spotted wilt virus affecting, in England, 763.

— *elegans*, celery virus 1 can infect, 5; occurrence on, in U.S.A., 615.

—, cucumber mosaic can infect, 473, 812.

—, tobacco aucuba mosaic, tobacco mosaic, and tobacco ring spot can infect, 812.

— *pauciflora*, *Entyloma zinniae* on, in S. Africa, 793.

*Zizyphus jujuba*, *Mitteriella zizyphina* on, in India, 700.

— *oenoplia*, *Mitteriella zizyphina* on, in India, 700.

—, spike disease of, in India, 539, 802.

—, *rotundifolia*, *Mitteriella zizyphina* on, in India, 700.

Zonal rot of tulip in Denmark, 559.

Zonate chlorosis of citrus considered identical with ring blotch, 505.

*Zoopage phanera* on *Amoeba terricola* in U.S.A., 360.

*Zosmenus quadratus* transmitting beet crinkle to beet and spinach, 548.

*Zostera marina*, dying-off of, factors affecting, 599, 709; in relation to *Labyrinthula*, 599; *Ophiobolus*, 50, 326; *O. halimus*, 50, 599; *O. maritimus*, 50; note on, 245; occurrence in Channel Islands, 50; in Denmark, 50, 326; in England, 50; in France, 600; in Ireland, 50; in Norway, 326; in Sweden, 326, 709; in U.S.A., 599; recent investigations on, 600; studies on, 50, 326, 599.

—, (?) *Labyrinthula* on, in U.S.A., 599.

—, *Ophiobolus* on, in Denmark, 50, 326; in Norway and Sweden, 326.

—, — *halimus* on, in (?) Denmark, England, Ireland, and N. America, 50; in U.S.A., 599; *O. maritimus* in relation to, 50.

— var. *angustifolia*, resistance of, to dying-off of, 245, 599.

*Zoysia japonica*, *Puccinia zoysiae* on, in Japan, 796.

*Zygodesmus* in eggs in France, 237.

*Zygorrhynchus moelleri* in soil in Europe, 655.

*Zymonema dermatitidis* synonym of *Endomyces dermatitidis*, 100.

*Zythia versoniana* on pomegranate in China, 778.

PRINTED IN  
GREAT BRITAIN  
AT THE  
UNIVERSITY PRESS  
OXFORD  
BY  
JOHN JOHNSON  
PRINTER  
TO THE  
UNIVERSITY